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THE AMERICAN GAS LIGHT JOURNAL

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[OFFICIAL NOTICE.]

Fifteenth Annual Meeting, Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION,
QUINCY, ILLS., April 4th, 1892.

The Fifteenth Annual Meeting of the Western Gas Association will be held at Detroit, Mich., on the 18th, 19th and 20th days of May. The Russell House has been designated by the Committee of Arrangements as the headquarters of the Association, while the business sessions will be conducted in the Armory of the Detroit Light Infantry, two blocks distant from the Russell House. The proprietor of the Russell House, Mr. W. H. Chittenden, will take pleasure in reserving rooms for those who may apply in advance of the date of the meeting; and as the gentleman in question, aside from being the proprietor of the hotel, is also one of the Directors of the Detroit Gas Light Company, he will personally see to it that our members are housed in the way that gas men should be accommodated. The Russell House is conducted on the American plan, and the rates for members in attendance, their families and friends, will be $3 per day and upwards, according to location of rooms.

Your Secretary takes this occasion of stating that although no published announcement of the fact has heretofore been made, the special committee for the assignment of papers assembled at St. Louis on the 20th of January last and prepared a list of topics, treatises on which the committee believes will be of interest and value to our members generally. The authors as designated by the committee, almost without exception, acquiesced in the allotment, and several of the papers are already in the hands of the printer, and the remaining ones will be on hand in ample time for printing and illustrating. The list is as follows:

"Origin of Coal and Petroleum," by Mr. Alfred E. Forstall, Newark, N. J.

"New Features in the Routine Office Work of Small Gas Companies," by Mr. Walter Lee Brown, Evanston, Ills.

"Every Day Gas Analysis," by Mr. Wm. A. Stedman, Jr., St. Louis, Mo.

"The Advantages of Recuperative Furnaces in the Utilization of Heat," by Mr. Fred. Bredel, Milwaukee, Wis.

"Petroleum Products—Hydrocarbon Employed in Gas Manufacture," by Mr. C. M. Higgins, New York, N. Y.

"Fuel Gas as Viewed Through a Coal Gas Man's Spectacles," by Mr. K. M. Mitchell, St. Joseph, Mo.

"Practical Photometry Simplified for Daily Use," by Mr. B. E. Chollar, St. Louis, Mo.

"The Construction and Operation of Half-Depth Regenerative Furnaces for Firing with Cheap Coal," by Mr. W. H. Odiorne, Springfield, Ills.

It is this manifestation of willingness and zeal for the welfare of "The Western," and hearty and favorable response to requests for the preparation of papers, that lighten the labors of the officers of the Association and contribute so much to a successful meeting.

While the "Question-Box" has long since lost the charm of novelty, there is a feeling on the part of many of our members that our Association has never given this feature of its proceedings the prominence to which its importance entitles it. It has been suggested that we use our best efforts to make this one of the leading features of the Detroit Meeting. It is presumed that the main reason why the Question-Box has been slurred over with us in the way that it has is because the queries were usually put on the spur of the moment, and were as hastily, and, therefore, unsatisfactorily, answered. It is, therefore, recommended that on this occasion our members be requested to send to the Secretary, as far in advance of the date of the meeting as possible, the questions to which they wish replies. Such queries will be promptly announced in these columns, unaccompanied by the names of the senders, thus enabling those who desire to reply to properly prepare and duly weigh their answers before taking the floor for that purpose.

The annual membership list is now printed; and each of our members should have received a copy on the 20th of this month. If those who failed to receive a list will kindly notify the Secretary the omission will be cheerfully supplied. Application blanks will be mailed to those who may be desirious of joining our Association at its next meeting.

A. W. LITTLETON, Sec.

CAUSING THE "WHEELS TO GO 'ROUND."

At last we are enabled to state something specific respecting the money actually and unreservedly pledged to the Gas Industry Council for the construction and equipment of a building wherein gas may be shown at its best at the coming World's Fair. To begin with, the industry at large need not be informed as to the difficulties with which the Council was confronted, nor is it necessary to praise them for the assidnity and singleness of purpose that animated them in their pursuit of a result that can only be to the common benefit of the industry at large. It is our express desire to emphasize this point—the gentlemen comprising the Council, have had, have, and will have but one end to achieve. Their earnest desire, in common with every gas maker, apparatus constructor, or gas shareholder not personally represented on the Council, is to make a showing at the Fair that will bring profitable results to us all. There is not a single evidence of cross purposes in their doings, and no one interest seeks to outwit or disadvantage any other interest. Mutual benefit is the impelling motive, and the only motive. An adjourned meeting of the Council was held in this city on Monday last, and although the actual money pledged amounted to something less than $30,000, the Council decided to forward to the World's Fair Commissioners on Tuesday last, a formal acceptance of the site, accompanied by a pledge that the building would be erected. Thus it is seen that the industry is committed absolutely to the scheme, and that committal must be completed to the utmost. The gas industry has never yet failed to redeem its word, nor shall it fail in this instance to carry itself as it has in the past.

Although our present list of subscribers shows a net total short of $30,000, it is nevertheless true that promises (that are virtually as sound as pledges) have been made of additional subscriptions, the same to become effective when the different Boards of Directors have passed upon them, which will bring the total sum to date up to fully $50,000. For instance, we know that the Directors of the American Meter Company, at a meeting held in this city on Tuesday last (19th inst.), appropriated $1,000 as the Company's subscription to the building. However, what the Council needs is money, and it is wanted right away; and the JOURNAL does not appeal to its readers for their material aid in the premises, because we know that they never yet were wanting when it came to a question of doing that which was to redound to their credit and inure to their profit.

The list as forwarded by Mr. A. C. Humphreys, whose indefatigable work in connection with this affair must be heartily recognized, is as follows :

Date.	Name and Location of Subscriber.	Sum.
Mar. 11.	Charles H. Nettleton, Birmingham, Conn.	$100 00
" 12.	D. E. Fleming, Fredericksburg, Va.	10 00
" 14.	Kenton Gas and Elec. Co., Kenton, Ohio.	16 00
" 14.	New Gas Light Co., Janesville, Wis.	50 00
" 15.	Abiel Heilman, Allentown, Pa.	100 00
" 16.	Hagerstown Light & Heat Co., Hagerstown, Md.	20 00
" 17.	Newark Gas Light Co., Newark, N. J.	1,000 00
" 17.	Port Jervis Gas Co., Port Jervis, N. Y.	10 00
" 18.	The Gas and Electric Light Co., Lincoln, Ill.	40 00
" 19.	St. Joseph Gas and Mfg. Co., St. Joseph, Mo.	200 00
" 21.	Dedham and Hyde Park Gas and Electric Light Co., Dedham, Mass.	20 00
" 21.	Marblehead Gas & Elec. Lt. Co., Marblehead, Mass.	10 00
" 21.	Danvers Gas Lt. Co., Danvers, Mass.	10 00
" 21.	Madison Gas Lt. and Coke Co., Madison, Wis.	75 00
" 21.	Consumers Gas Co., Toronto, Ont.	2,000 00
" 23.	Seattle Gas, Elec. and Motor Co., Seattle, Wash.	200 00
" 24.	Clinton Gas Lt. Co., Clinton, Mass.	32 00
" 24.	United Gas Improvement Co., Phila., Pa.	10,000 00
" 28.	Ithaca Gas Lt. Co., Ithaca, N. Y.	25 00
" 28.	AMERICAN GAS LIGHT JOURNAL, New York City.	250 00
" 29.	Washington Gas Lt. Co., Washington, D. C.	2,500 00
" 29.	Connelly Iron Sponge & Governor Co., N.Y. City.	100 00
" 29.	Norwich City Gas Co., Norwich, Conn.	75 00
" 29.	D. McDonald & Co., Albany, N. Y.	500 00
" 29.	Bath Gas Co., Bath, N. Y.	25 00
" 29.	College Point Gas Co., College Point, N. Y.	20 00
" 29.	Auburn Gas Lt. Co., Auburn, N. Y.	50 00
" 29.	Binghamton Gas and Elec. Co., Binghamton, N.Y.	250 00
" 29.	Leominster Gas Lt. Co., Leominster, Mass.	10 00
" 29.	Richmond Gas Co., Richmond, Ind.	160 00
" 29.	Brattleboro Gas Lt. Co., Brattleboro, Vt.	20 00
" 29.	Newton Gas Lt. Co., Newton, N. J.	10 00
Mar. 29.	Geneva Gas Lt. Co., Geneva, N. Y.	$25 00
" 29.	Nyack Gas Works. Nyack, N. Y.	8 00
" 29.	Athens Gas Lt. and Elec. Co., Athens, O.	20 00
" 29.	Mansfield Gas Lt. Co., Mansfield, O.	60 00
" 29.	Watertown Gas Lt. Co., Watertown, N. Y.	52 00
" 29.	J. F. Seamon, Uniontown, Pa.	10 00
" 30.	Anniston Gas and Lt. Co., Anniston, Ala.	10 00
" 30.	Monmouth Gas Co., Monmouth, Ills.	20 00
" 30.	Chas. J. Hayes, Palatka, Fla.	5 00
" 30.	Michigan City Gas Co., Michigan City, Ind.	50 00
" 30.	Bethlehem Gas Co., Bethlehem, Pa.	25 00
" 30.	Maryland Meter and Mfg. Co., Baltimore, Md.	250 00
" 30.	Hudson County Gas Lt. Co., Hoboken, N. J.	380 00
" 30.	Mt. Vernon Gas Lt. and Coke Co., Mt. Vernon, O.	40 00
" 30.	Providence Gas Co., Providence, R. I.	500 00
" 30.	Hamilton Gas Lt. Co., Hamilton, Ontario.	232 00
" 30.	Cobourg Gas Co., Cobourg, Ontario.	12 00
" 30.	Citizens Gas Lt. Co., Newark, N. J.	250 00
" 30.	North Adams Gas Lt. Co., North Adams Mass.	75 00
" 30.	Windsor Gas Co., Windsor, Ontario.	50 00
" 30.	Buffalo Mutual Gas Lt. Co., Buffalo, N. Y.	200 00
" 30.	Quincy Gas Lt. and Coke Co., Quincy, Ills.	200 00
" 30.	Warren Gas Lt. Co., Warren, O.	40 00
" 31.	Nashua Lt., Heat and Power Co., Nashua, N. H.	100 00
" 31.	Akron Gas Co., Akron, O.	75 00
" 31.	Piqua Gas Lt. and Coke Co., Piqua, O.	35 00
" 31.	Urbana Gas Lt. and Coke Co., Urbana, O.	40 00
" 31.	Port Huron Gas Lt. Co., Port Huron, Mich.	40 00
" 31.	Winsted Gas Co., West Winsted, Conn.	8 00
" 31.	James Slade, Yonkers, N. Y.	25 00
" 31.	South Bend Gas Co., South Bend, Ind.	50 00
" 31.	C. S. Lowe Gas and Elec. Co., Colo. Springs, Col.	25 00
April 1.	Charlotte Gas Co., Charlotte, Mich.	15 00
" 1.	Jackson Gas Lt. Co., Jackson, Cal.	5 00
" 1.	Belfast Illuminating Co., Belfast, Me.	5 00
" 2.	Washington Gas Lt. Co., Washington C. H., O.	10 00
" 2.	Coshocton Gas Works, Coshocton, O.	14 00
" 2.	Bridgeton Gas Lt. Co., Bridgeton, N. J.	50 00
" 2.	Norwalk Gas Lt. Co., Norwalk, Conn.	56 00
" 5.	Lambertville Gas Lt. Co., Lambertville, N. J.	20 00
" 7.	Steubenville Gas and Elec. Co., Steubenville, O.	100 00
" 7.	Portland Gas Lt. Co., Portland, Ore.	300 00
" 8.	Little Falls Gas Lt. Co., Little Falls, N. Y.	50 00
" 11.	Joliet Gas Lt. Co., Joliet, Ills.	50 00
" 11.	Walla Walla Gas & Elec. Co., Walla Walla, Wash.	20 00
" 12.	Deily & Fowler, Philadelphia, Pa.	300 00
" 12.	Keystone Meter Co., Royersford, Pa.	100 00
" 12.	R. D. Wood & Co., Philadelphia, Pa.	2,000 00
" 12.	Vineland Gas Works, Vineland, N. J.	12 00
" 12.	McKeesport Gas Co., McKeesport, Pa.	50 00
" 12.	Shamokin Gas Lt. Co., Shamokin, Pa.	13 28
" 13.	Johnstown Gas Co., Johnstown, Pa.	50 00
" 13.	B. Kreischer & Sons, New York City.	200 00
" 13.	Adam Weber, New York City.	200 00
" 13.	Middletown Gas Co., Middletown, O.	15 00
" 13.	Zanesville Gas Lt. Co., Zanesville, O.	160 00
" 13.	Flushing Gas Lt. Co., Flushing, N. Y.	40 00
" 13.	La Crosse Gas Lt. Co., La Crosse, Wis.	25 00
" 13.	Huntsville Gas Lt. and Coke Co., Huntsville, Ala.	48 00
" 14.	Pittston Gas Lt. Co., Pittston Pa.	32 00
" 14.	Citizens Gas Lt. Co., Brooklyn, N. Y.	800 00
" 14.	Oberlin Gas and Elec. Co., Oberlin, Ohio.	12 00
" 14.	Bartlett, Hayward and Co., Baltimore, Md.	1,000 00
" 14.	Springfield Gas Lt. & Coke Co., Springfield, Ohio.	200 00
" 14.	Shelbyville Gas Lt. Co., Shelbyville, Ind.	20 00
" 14.	Beloit Gas Lt. and Coke Co., Beloit, Wis.	25 00
" 14.	Moses G. Wilder, Philadelphia, Pa.	50 00
" 14.	Society of Gas Lighting, New York City.	250 00
" 14.	Fort Scott Lt. and Fuel Co., Fort Scott, Kas.	50 00
" 14.	Rock Island Gas Co., Rock Island, Ill.	50 00
" 15.	D. W. Hunt and Son, Fort Dodge, Io.	10 00
" 15.	Frederick Egner, New York City.	25 00
" 15.	Peoples Lt. and Fuel Mfg. Co., Moline, Ill.	40 00
" 16.	Newburyport Gas & Elec. Co., Newburyport, Mass.	36 00
" 16.	Consolidated Gas Co., Baltimore, Md.	1,000 00
" 16.	Schneider and Trenkamp Co., Cleveland, Ohio.	300 00
" 18.	South Side Gas Co., Pittsburg, Pa.	181 00
	Total	$28,789 28

BRIEFLY TOLD.

THE DETROIT MEETING.—The official notice from Secretary Littleton in the current issue reveals the fact that the Western Association's paper list is one of more than ordinary promise. New names are coupled with new subjects, and 1 or 2 of the yoemen of the guard are again in line. The Secretary is busily wrestling with the problem of securing reduced transportatiou rates and while we are unable to say positively at this time that he has arranged everything in this regard, it is odds on that he will be successful—as usual. In the meantime the local committee of arrangements, headed by Col. Croul and Mr. Baxter, are quietly enjoying the satisfaction that comes to those who know that their part in the preliminaries has been attended to with tact, discretion and dispatch.

NOTES.—The Exeter (N. H.) Gas Light Company has authorized the issue of 500 shares of new stock (par value, $50), to cover the cost of plant improvement which includes a new holder——Since the 1st instant the price of gas for fuel purposes at Fort Worth, Texas, has ruled at $1.50 per 1,000 cubic feet. This is certainly cheap gas.——It is said that a suit to test the validity of the exclusive right enjoyed by the Minneapolis Gas Company to supply gas in that city will be brought. The Duluth decision reported in our item columns to-day, will probably cause the carrying of this moot-point to the U. S. Supreme Court.

Report of the Committee Appointed by the Society of Gas Lighting to Devise a Plan for Uniformity in Gas Works Castings.

Your Committee appointed at the November (1890) meeting of the Society to look into the matter of special castings for gas works, last May made a report thereon, covering principally those castings used about the works proper. We were then instructed to proceed further and get up schedules and tables regulating the sizes, etc., of those specials used in the laying of street mains. We have given this subject proper consideration and herewith present the result of our labor.

Regarding the pipes themselves, which are used for laying street mains, we already mentioned in our preliminary report that the same should be of uniform length. They are now delivered in 12-feet lengths, nominally and net measurement—that is, from back of bell to end of spigot. Actually those pipes measure from 11 feet 8 inches to 12 feet 6 inches or thereabouts, and it has happened that pipes from the same foundry, and of the same internal diameter, were of different lengths. It need hardly be mentioned that these deviations from the standard length are very annoying in laying out and figuring up street work.

For this reason, and, since street main castings are under consideration, it would be well to stipulate that, as 12 feet has been generally accepted as the proper length of a pipe, this standard should be strictly adhered to, and should mean the net length of a pipe as laid in the ground and exclusive of bell. Make this a condition of every pipe contract and see it strictly carried out.

In relation to the thickness of pipes it is impossible to establish a hard-and-fast rule, since this thickness of metal largely depends on local circumstances—like the nature of the soil in which the pipes are to be laid, and also upon the length of the purse of the gas company concerned. We would, however, recommend that the *outside* diameters of the pipes of the different sizes be kept invariable or fixed, and that the *inside* diameters, or the *bores*, of the pipes be changed, where a deviation from the standard thickness is desired. Then the bells and spigots of pipes of various thicknesses will always fit each other, as well as those of the special castings made according to our rules.

The standard thicknesses and weights of the different sizes of pipes are, then, as follows :

Internal Diameter of Pipe	Thickness of Metal.	External Diameter of Pipe.	Weight per Foot, Exclusive of Bell.	Weight of Bell.	Weight per Foot, Inclusive of Bell.	Weight per Length of 12 Feet.
30 in.	$\frac{7}{8}$ in.	$31\frac{3}{4}$ in.	265 lbs.	292 lbs.	289.3 lbs.	3,472 lbs.
24 "	$\frac{3}{4}$ "	$25\frac{1}{2}$ "	182 "	198 "	198.5 "	2,382 "
20 "	$\frac{3}{4}$ "	$21\frac{1}{2}$ "	153 "	162 "	166.5 "	1,998 "
16 "	$\frac{5}{8}$ "	$17\frac{1}{4}$ "	102 "	102 "	110.5 "	1,326 "
12 "	$\frac{9}{16}$ "	$13\frac{1}{8}$ "	70 "	65 "	75.4 "	905 "
10 "	$\frac{1}{2}$ "	11 "	52 "	49 "	56.1 "	673 "
8 "	$\frac{7}{16}$ "	$8\frac{7}{8}$ "	36 "	39 "	39.25 "	471 "
6 "	$\frac{3}{8}$ "	$6\frac{7}{8}$ "	23.5"	23 "	25.5 "	306 "
4 "	$\frac{3}{8}$ "	$4\frac{3}{4}$ "	16 "	16 "	17.33 "	208 "
3 "	$\frac{5}{16}$ "	$3\frac{5}{8}$ "	10.1"	11 "	11.0 "	132 "

Specials for street work, as at present delivered, are of all sorts of shapes and thicknesses, cast from patterns which have been gotten up at the various foundries at different times and for different purposes, generally without following any particular rule. We do not claim that the specials represented in the sketches annexed to this report are of novel or superior design, but we do claim that their adoption would lead to uniformity in these patterns and would cut off much unnecessary bulk and weight.

The specials as now made by pipe foundries are very often not only large in size, but also extravagantly heavy in metal and, although their price per pound is generally quite reasonable, are very dear, considering this extra weight, and are besides cumbersome things to handle. There is no good reason why such specials should be any heavier than the corresponding size of pipe, upon which there is the same pressure or strain, and which is exposed to the same wear and tear. We could even well afford to pay a reasonable advance per pound upon specials cast according to proposed models and still be considerably the gainers by the change. It is a fact that it now pays to have light weight specials made at high-priced city foundries, and to pay from $\frac{1}{4}$ to 1 cent a pound more than that charged by pipe makers, who turn out heavy castings, probably originally designed for water works.

As to thickness of metal, dimensions of bells, etc., we have adhered to the standard laid down in our preliminary report, of which all the members have received copies.

On annexed tracings are shown sketches of bells and spigots, four-way and three-way branches, bends of various kinds, reducers, drips, solid and split sleeves and plugs ; also, tables giving the dimensions of same for the various sizes of pipe, from 3 to 30 inches. They explain themselves and little need be said in addition.

As to four-way branches, we think the most practical form is that with four bells or sockets, as its use gives the pipe layer a chance to use up all his spigot pieces of pipe, and he always has a bell to start from. Four-ways with the smaller outlets in the center line of larger pipe will answer in many cases, but frequently it is necessary to have the *bottoms* of the two branch pipes on the same level, so as to be able to throw the descent from the larger into the smaller pipe, and prevent any accumulation of water in the lower part of four-way. A four-way with bottom outlets will, therefore, on the whole, be preferable. The same observation applies to three-ways, although in a lesser degree, as the three-way may often be tilted sufficiently to obtain the same result.

Bends are made with bell and spigot, and of the dimensions shown in preliminary report. As to reducers, to avoid a multitude of patterns, only two are proposed for each size of pipes reducing to the next two smaller sizes. If a further reduction in size is desired, two, or even three, reducers are to be used. All reducers have the same taper, about 1 inch in 4 inches of length.

Drips are shown from 3 inches to 16 inches diameter of pipe. Larger drips are probably never used—big lines of pipe generally having drip pots placed at the outlet of a branch and at one side of the line. The diameters of sleeves are made a little larger than those of the corresponding bells, so as to give a little more liberty in their use and to accommodate older and heavier castings which might be met with in making repairs, etc.

All of which is respectfully submitted for your consideration.

A. H. STRECKER,
EUGENE VANDERPOOL,
A. B. SLATER,
D. D. FLEMMING,
} Committee.

[*See illustrations and tables on pages* 596, 597, 598 *and* 599.]

At a meeting of the Society of Gas Lighting, held at the works of the Nassau Gas Light Company, in Brooklyn, on January 21, 1892, the above rules and schedules relating to pipes and special castings were formally adopted.

Of the leading manufacturers of gas works apparatus and pipes who have been communicated with on the subject, the following have so far declared themselves in favor of the new standard and will be guided by it in the future :

Jas. R. Floyd & Sons, New York.
The Continental Iron Works, Brooklyn.
Bartlett, Hayward & Co., Baltimore.
The Isbell-Porter Co., New York.
R. D. Wood & Co., Philadelphia.
The Davis & Farnum Manufacturing Co., Waltham, Mass.
The McNeal Pipe and Foundry Co., Burlington, N. J.
The Gloucester Iron Works, Philadelphia.

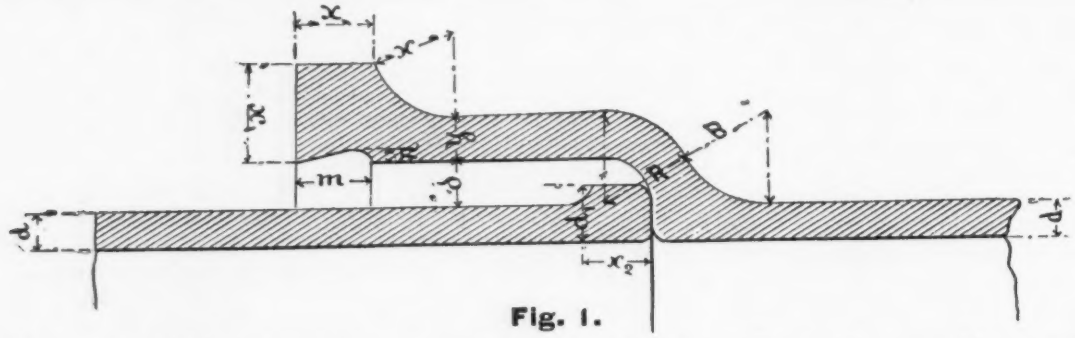


Fig. 1.

$x = 2.33\,d.$ $x_1 = 3.00\,d.$ $x_2 = 1.80\,d.$ $y = 1.40\,d.$ $d_1 = d + \frac{1}{2}$ in. $R = y + \delta.$ $m = \frac{1}{4}$ in. $n = \frac{3}{16}$ in.

THREE-WAY BRANCHES.

CENTRE-OUTLET.

BOTTOM-OUTLET.

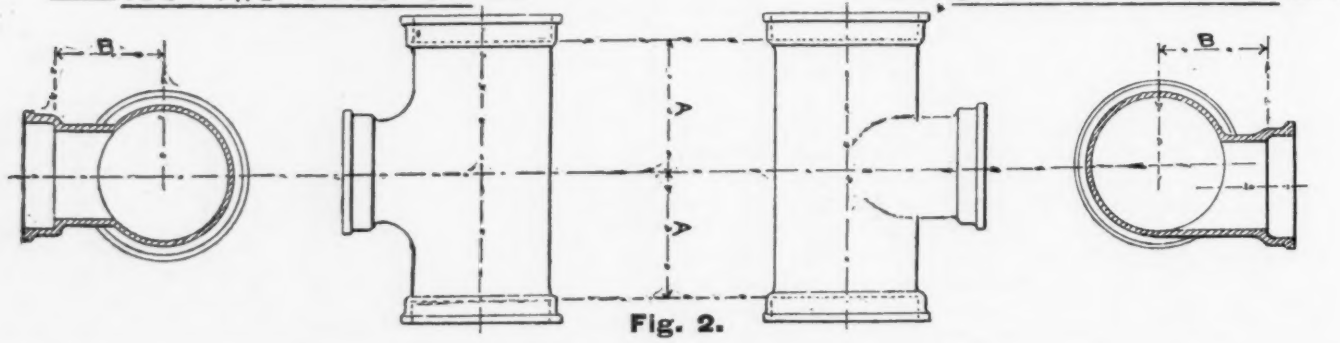


Fig. 2.

FOUR-WAY-BRANCHES.

CENTRE-OUTLETS.

BOTTOM-OUTLETS.

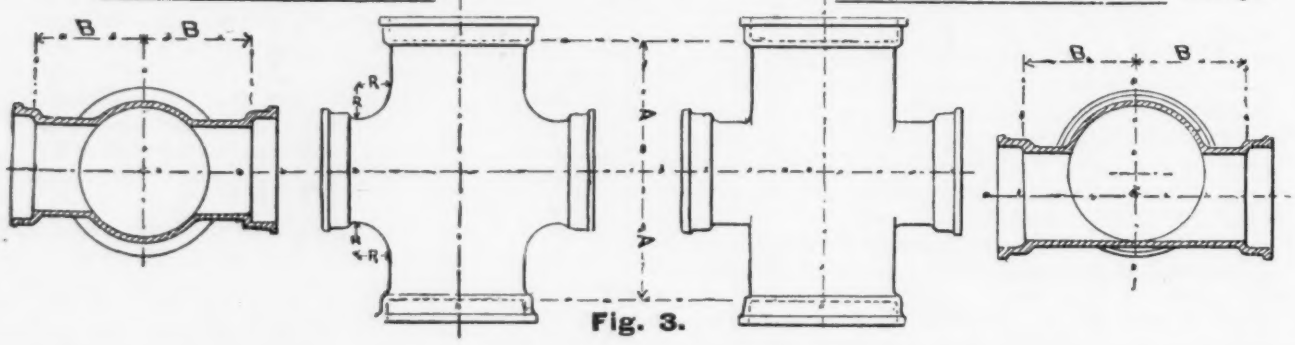
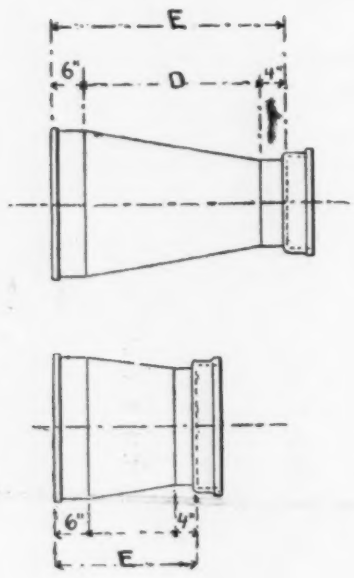
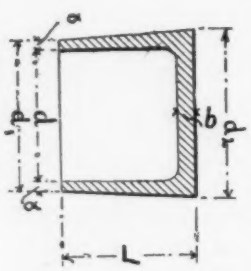


Fig. 3.

REDUCERS.



PLUGS.



$b = 1.5\,a.$

DRIPS.

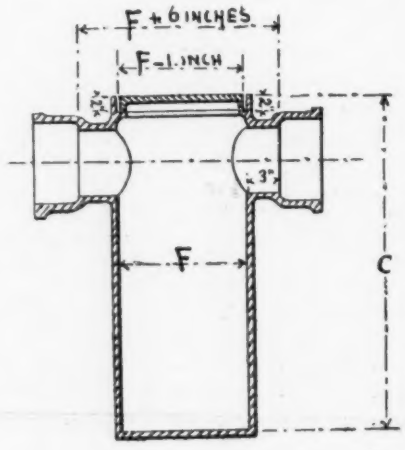


Fig. 4.

TABLE OF DIMENSIONS OF BELLS AND SPIGOT ENDS. (See Fig. 1.)

Diameter of Pipe.	Thickness of Pipe.	Diameter of Bell.	Depth of Bell.	Lead Joint. δ.	y.	x.	x_1.	x_2.	d_1.	R.	m.	n.
30 in.	$\frac{7}{8}$ in.	$32\frac{3}{4}$ in.	$4\frac{3}{4}$ in.	$\frac{1}{2}$ in.	$1\frac{1}{4}$ in.	$2\frac{1}{16}$ in.	$2\frac{5}{8}$ in.	$1\frac{5}{8}$ in.	$1\frac{1}{2}$ in.	$1\frac{3}{4}$ in.	$\frac{3}{4}$ in.	$\frac{3}{16}$ in.
24 "	$\frac{3}{4}$ "	$26\frac{1}{2}$ "	$4\frac{3}{4}$ "	do.	$1\frac{1}{16}$ "	$1\frac{3}{4}$ "	$2\frac{1}{4}$ "	$1\frac{3}{8}$ "	1 "	$1\frac{9}{16}$ "	do.	do.
20 "	$\frac{3}{4}$ "	$22\frac{1}{2}$ "	$4\frac{1}{2}$ "	do.	$1\frac{1}{16}$ "	$1\frac{3}{4}$ "	$2\frac{1}{4}$ "	$1\frac{1}{4}$ "	1 "	$1\frac{9}{16}$ "	do.	do.
16 "	$\frac{5}{8}$ "	$18\frac{1}{4}$ "	4 "	do.	$\frac{7}{8}$ "	$1\frac{1}{2}$ "	$1\frac{7}{8}$ "	$1\frac{1}{2}$ "	$\frac{7}{8}$ "	$1\frac{3}{8}$ "	do.	do.
12 "	$\frac{9}{16}$ "	$14\frac{1}{8}$ "	4 "	do.	$\frac{13}{16}$ "	$1\frac{5}{16}$ "	$1\frac{11}{16}$ "	1 "	$\frac{13}{16}$ "	$1\frac{5}{16}$ "	do.	do.
10 "	$\frac{1}{2}$ "	12 "	4 "	do.	$\frac{11}{16}$ "	$1\frac{3}{16}$ "	$1\frac{1}{2}$ "	$\frac{7}{8}$ "	$\frac{3}{4}$ "	$1\frac{3}{16}$ "	do.	do.
8 "	$\frac{7}{16}$ "	$9\frac{7}{8}$ "	4 "	do.	$\frac{5}{8}$ "	$1\frac{1}{16}$ "	$1\frac{5}{16}$ "	$\frac{3}{4}$ "	$\frac{11}{16}$ "	$1\frac{1}{2}$ "	do.	do.
6 "	$\frac{3}{8}$ "	$7\frac{3}{4}$ "	4 "	do.	$\frac{9}{16}$ "	$\frac{7}{8}$ "	$1\frac{1}{8}$ "	$\frac{5}{8}$ "	$\frac{5}{8}$ "	$1\frac{1}{16}$ "	do.	do.
4 "	$\frac{3}{8}$ "	$5\frac{3}{4}$ "	4 "	do.	$\frac{9}{16}$ "	$\frac{7}{8}$ "	$1\frac{1}{8}$ "	$\frac{5}{8}$ "	$\frac{5}{8}$ "	$1\frac{1}{16}$ "	do.	do.
3 "	$\frac{5}{16}$ "	$4\frac{5}{8}$ "	4 "	do.	$\frac{7}{16}$ "	$\frac{3}{4}$ "	$1\frac{1}{16}$ "	$\frac{1}{2}$ "	$\frac{9}{16}$ "	$1\frac{5}{16}$ "	do.	do.

For pipes cast vertically, y is to be taken as the minimum thickness of bell, and allowance for draught of pattern to be added.

TABLE OF DIMENSIONS OF THREE-WAY BRANCHES. (See Fig. 2.)

Size.	Thickness of Metal.	Distance A.	Distance B.	Wght	Size.	Thickness of Metal.	Distance A.	Distance B.	Wght
30 x 30	$\frac{7}{8}$ in.	25 in.	25 in.		16 x 16	$\frac{5}{8}$ in.	17 in.	17 in.	
30 x 24	do	do	24 "		16 x 12	do	do	16 "	
30 x 20	do	do	$23\frac{1}{2}$ "		16 x 10	do	do	15 "	
30 x 16	do	do	23 "		16 x 8	do	do	$14\frac{1}{2}$ "	
30 x 12	do	do	$22\frac{1}{2}$ "		16 x 6	do	do	14 "	
30 x 10	do	do	22 "		16 x 4	do	do	$13\frac{1}{2}$ "	
30 x 8	do	do	$21\frac{1}{2}$ "		16 x 3	do	do	13 "	
30 x 6	do	do	21 "		12 x 12	$\frac{9}{16}$ in.	14 in.	14 "	
30 x 4	do	do	$20\frac{1}{2}$ "		12 x 10	do	do	13 "	
30 x 3	do	do	20 "		12 x 8	do	do	$12\frac{1}{2}$ "	
24 x 24	$\frac{3}{4}$ in.	22 in.	22 "		12 x 6	do	do	12 "	
24 x 20	do	do	21 "		12 x 4	do	do	$11\frac{1}{2}$ "	
24 x 16	do	do	20 "		12 x 3	do	do	11 "	
24 x 12	do	do	$19\frac{1}{2}$ "		10 x 10	$\frac{1}{2}$ in.	12 in.	12 "	
24 x 10	do	do	19 "		10 x 8	do	do	$11\frac{1}{2}$ "	
24 x 8	do	do	$18\frac{1}{2}$ "		10 x 6	do	do	11 "	
24 x 6	do	do	18 "		10 x 4	do	do	$10\frac{1}{2}$ "	
24 x 4	do	do	$17\frac{1}{2}$ "		10 x 3	do	do	10 "	
24 x 3	do	do	17 "		8 x 8	$\frac{7}{16}$ in.	10 in.	10 "	
20 x 20	$\frac{3}{4}$ in.	20 in.	20 "		8 x 6	do	do	$9\frac{1}{2}$ "	
20 x 16	do	do	19 "		8 x 4	do	do	9 "	
20 x 12	do	do	18 "		8 x 3	do	do	9 "	
20 x 10	do	do	$17\frac{1}{2}$ "		6 x 6	$\frac{3}{8}$ in.	8 in.	8 "	
20 x 8	do	do	17 "		6 x 4	do	do	8 "	
20 x 6	do	do	$16\frac{1}{2}$ "		6 x 3	do	do	$7\frac{1}{2}$ "	
20 x 4	do	do	16 "		4 x 4	do	6 in.	6 "	
20 x 3	do	do	$15\frac{1}{2}$ "		4 x 3	do	do	6 "	
					3 x 3	$\frac{5}{16}$ in.	5 in.	5 "	

Weight to be determined from accurate castings.

TABLE OF DIMENSIONS OF FOUR-WAY BRANCHES. (See Fig. 3.)

Size.	Thickness of Metal.	Distance A.	Distance B.	Wght	Size.	Thickness of Metal.	Distance A.	Distance B.	Wght
30 x 30	$\frac{7}{8}$ in.	25 in.	25 in.		16 x 16	$\frac{5}{8}$ in.	17 in.	17 in.	
30 x 24	do	do	24 "		16 x 12	do	do	16 "	
30 x 20	do	do	$23\frac{1}{2}$ "		16 x 10	do	do	15 "	
30 x 16	do	do	23 "		16 x 8	do	do	$14\frac{1}{2}$ "	
30 x 12	do	do	$22\frac{1}{2}$ "		16 x 6	do	do	14 "	
30 x 10	do	do	22 "		16 x 4	do	do	$13\frac{1}{2}$ "	
30 x 8	do	do	$21\frac{1}{2}$ "		16 x 3	do	do	13 "	
30 x 6	do	do	21 "		12 x 12	$\frac{9}{16}$ in.	14 in.	14 "	
30 x 4	do	do	$20\frac{1}{2}$ "		12 x 10	do	do	13 "	
30 x 3	do	do	20 "		12 x 8	do	do	$12\frac{1}{2}$ "	
24 x 24	$\frac{3}{4}$ in.	22 in.	22 "		12 x 6	do	do	12 "	
24 x 20	do	do	21 "		12 x 4	do	do	$11\frac{1}{2}$ "	
24 x 16	do	do	20 "		12 x 3	do	do	11 "	
24 x 12	do	do	$19\frac{1}{2}$ "		10 x 10	$\frac{1}{2}$ in.	12 in.	12 "	
24 x 10	do	do	19 "		10 x 8	do	do	$11\frac{1}{2}$ "	
24 x 8	do	do	$18\frac{1}{2}$ "		10 x 6	do	do	11 "	
24 x 6	do	do	18 "		10 x 4	do	do	$10\frac{1}{2}$ "	
24 x 4	do	do	$17\frac{1}{2}$ "		10 x 3	do	do	10 "	
24 x 3	do	do	17 "		8 x 8	$\frac{7}{16}$ in.	10 in.	10 "	
20 x 20	$\frac{3}{4}$ in.	20 in.	20 "		8 x 6	do	do	$9\frac{1}{2}$ "	
20 x 16	do	do	19 "		8 x 4	do	do	9 "	
20 x 12	do	do	18 "		8 x 3	do	do	9 "	
20 x 10	do	do	$17\frac{1}{2}$ "		6 x 6	$\frac{3}{8}$ in.	8 in.	8 "	
20 x 8	do	do	17 "		6 x 4	do	do	8 "	
20 x 6	do	do	$16\frac{1}{2}$ "		6 x 3	do	do	$7\frac{1}{2}$ "	
20 x 4	do	do	16 "		4 x 4	do	6 in.	6 "	
20 x 3	do	do	$15\frac{1}{2}$ "		4 x 3	do	do	6 "	
					3 x 3	$\frac{5}{16}$ in.	5 in.	5 "	

Weight to be determined from accurate castings.

TABLE OF DIMENSIONS OF REDUCERS. (See Fig. 4.)

Size.	Thickness of Metal.	Distance D.	Distance E.	Weight.
30 x 24 in.	$\frac{7}{8}$ in.	2 ft. 0 in.	2 ft. 10 in.	995 lbs.
30 x 20 "	do.	3 ft. 4 in.	4 ft. 2 in.	1,046 "
24 x 20 "	$\frac{3}{4}$ in.	1 ft. 4 in.	2 ft. 2 in.	536 "
24 x 16 "	do.	2 ft. 8 in.	3 ft. 6 in.	642 "
20 x 16 "	do.	1 ft. 4 in.	2 ft. 2 in.	403 "
20 x 12 "	do.	2 ft. 8 in.	3 ft. 6 in.	499 "
16 x 12 "	$\frac{5}{8}$ in.	1 ft. 4 in.	2 ft. 2 in.	263 "
16 x 10 "	do.	2 ft. 0 in.	2 ft. 10 in.	287 "
12 x 10 "	$\frac{9}{16}$ in.	0 ft. 8 in.	1 ft. 6 in.	147 "
12 x 8 "	do.	1 ft. 4 in.	2 ft. 2 in.	167 "
10 x 8 "	$\frac{1}{2}$ in.	0 ft. 8 in.	1 ft. 6 in.	111 "
10 x 6 "	do.	1 ft. 4 in.	2 ft. 2 in.	115 "
8 x 6 "	$\frac{7}{16}$ in.	0 ft. 8 in.	1 ft. 6 in.	73 "
8 x 4 "	do.	1 ft. 4 in.	2 ft. 2 in.	79 "
6 x 4 "	$\frac{3}{8}$ in.	0 ft. 8 in.	1 ft. 6 in.	48 "
6 x 3 "	do.	1 ft. 0 in.	1 ft. 10 in.	47 "
4 x 3 "	do.	0 ft. 4 in.	1 ft. 2 in.	29 "

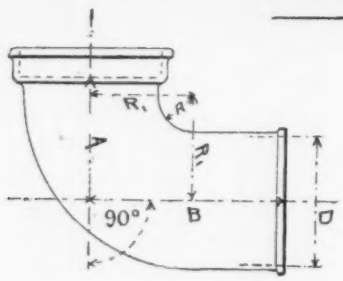
TABLE OF DIMENSIONS OF DRIPS. (See Fig. 4.)

Size.	Thickness of Metal.	Diameter of Pot F.	Depth of Pot G.	Weight.
3 in.	$\frac{9}{16}$ in.	12 in.	2 ft. 6 in.	242 lbs.
4 "	do.	do.	do.	252 "
6 "	do.	do.	do.	266 "
8 "	do.	do.	do.	300 "
10 "	do.	do.	3 ft. 0 in.	360 "
12 "	do.	do.	do.	405 "
16 "	do.	16 in.	3 ft. 6 in.	605 "

TABLE OF DIMENSIONS OF PLUGS. (See Fig. 4.)

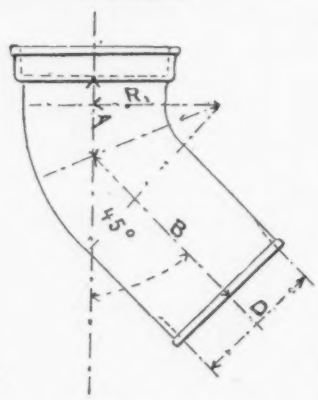
Diameter d.	Diameter d_1.	Diameter d_2.	Length L.	Weight.
30 in.	$31\frac{3}{4}$ in.	$32\frac{1}{8}$ in.	7 in.	408 lbs.
24 "	$25\frac{1}{8}$ "	$25\frac{7}{8}$ "	7 "	250 "
20 "	$21\frac{1}{8}$ "	$21\frac{7}{8}$ "	$6\frac{1}{2}$ "	183 "
16 "	$17\frac{1}{4}$ "	$17\frac{9}{16}$ "	6 "	105 "
12 "	$13\frac{1}{8}$ "	$13\frac{7}{16}$ "	6 "	65 "
10 "	11 "	$11\frac{3}{16}$ "	6 "	45 "
8 "	$8\frac{7}{8}$ "	$9\frac{3}{16}$ "	6 "	32 "
6 "	$6\frac{3}{8}$ "	$7\frac{1}{16}$ "	6 "	19 "
4 "	$4\frac{3}{8}$ "	$5\frac{1}{16}$ "	6 "	12 "
3 "	$3\frac{1}{8}$ "	$3\frac{15}{16}$ "	6 "	8 "

BENDS.

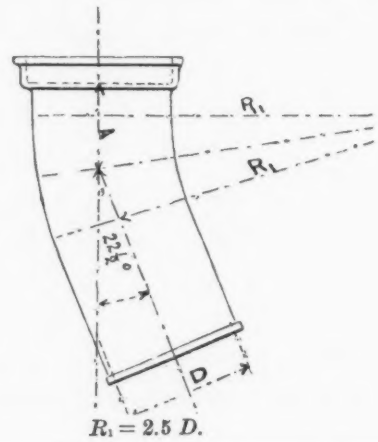


For full bends $R_1 = R + \frac{D}{2} + d$.

For radius R, see Table of Flange Bends.

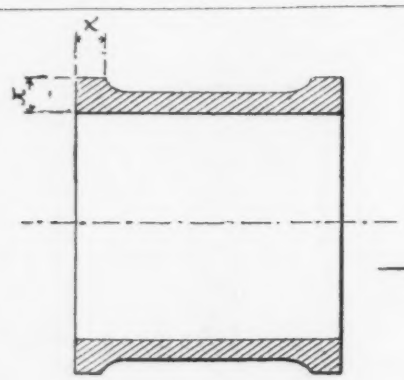


$R_1 = D$.

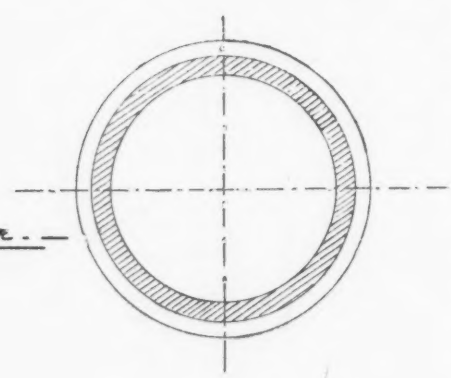


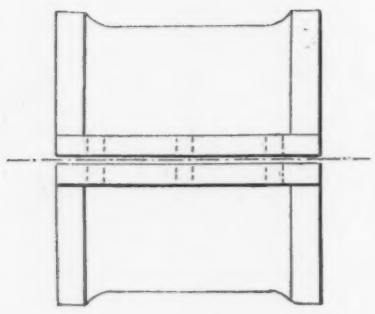
$R_1 = 2.5\ D$.

Fig. 5.



SOLID SLEEVE.





SPLIT SLEEVE.

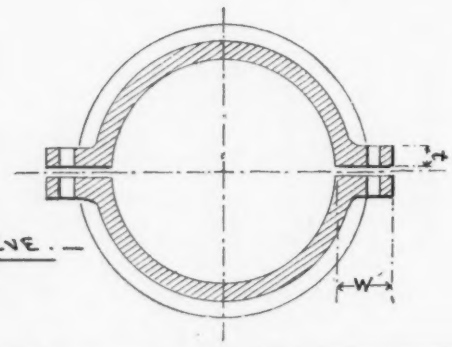
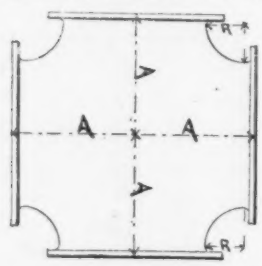
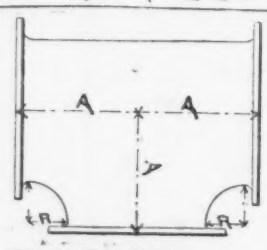


Fig. 6.

FLANGE PIECES.

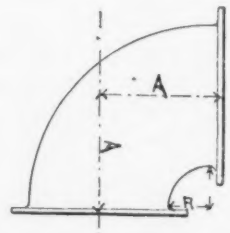


FOUR WAY.

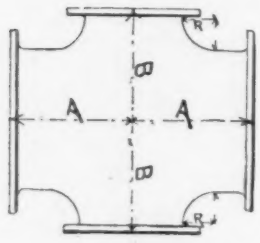


THREE WAY.

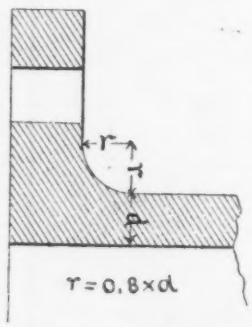
WITH OUTLETS OF EVEN SIZE.



BEND.



FOUR WAY WITH SMALLER LATERAL OUTLETS.



SECTION OF FLANGE.

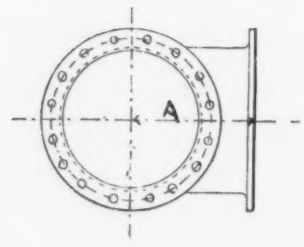


Fig. 7.

Bolt Holes to be laid out so as to straddle centre lines both vertically and horizontally. For dimensions B see Table of Bell, Four-Ways and Three-Ways.

TABLE OF DIMENSIONS OF BENDS. (See Fig. 5.)

FULL BEND.						HALF BEND.				QUARTER BEND.			
Diameter of Pipe.	Thickness of Metal. d.	Distance A.	Distance B.	Radius R_1.	Weight.	Distance A.	Distance B.	Radius R_1.	Weight.	Distance A.	Distance B.	Radius R_1.	Weight.
30 in.	$\frac{7}{8}$ in.	25 in.	42 in.	$22\frac{7}{8}$ in.	To be determined from accurate castings.	17 in.	42 in.	30 in.	To be determined from accurate castings.	17 in.	42 in.	75 in.	To be determined from accurate castings.
24 "	$\frac{3}{4}$ "	22 "	36 "	$19\frac{3}{4}$ "		14 "	36 "	24 "		14 "	36 "	60 "	
20 "	$\frac{3}{4}$ "	20 "	36 "	$16\frac{3}{4}$ "		12 "	36 "	20 "		12 "	36 "	50 "	
16 "	$\frac{5}{8}$ "	17 "	36 "	$14\frac{5}{8}$ "		10 "	36 "	16 "		10 "	36 "	40 "	
12 "	$\frac{9}{16}$ "	14 "	30 "	$11\frac{1}{16}$ "		8 "	30 "	12 "		8 "	30 "	30 "	
10 "	$\frac{1}{2}$ "	12 "	30 "	$9\frac{1}{2}$ "		7 "	30 "	10 "		7 "	30 "	25 "	
8 "	$\frac{7}{16}$ "	10 "	24 "	$7\frac{7}{16}$ "		6 "	24 "	8 "		6 "	24 "	20 "	
6 "	$\frac{3}{8}$ "	8 "	24 "	$6\frac{3}{8}$ "		5 "	24 "	6 "		5 "	24 "	15 "	
4 "	$\frac{5}{16}$ "	6 "	18 "	$4\frac{5}{8}$ "		4 "	18 "	4 "		4 "	18 "	10 "	
3 "	$\frac{5}{16}$ "	5 "	18 "	$3\frac{13}{16}$ "		3 "	18 "	3 "		3 "	18 "	$7\frac{1}{2}$ "	

TABLE OF DIMENSIONS OF SLEEVES. (See Fig. 6.)

SOLID SLEEVES.							SPLIT SLEEVES.				
Diameter of Pipe.	Diameter of Sleeve.	Length of Sleeve.	Thickness of Metal.	Thickness of Bead x.	Thickness of Bead x_1.	Weight of Solid Sleeve.	Width of Flange w.	Thickness of Flange t.	Number of Bolts Each Flange.	Diameter of Bolts.	Weight of Split Sleeve.
30 inch.....	$33\frac{1}{4}$ in.	12 in.	$1\frac{1}{4}$ in.	$2\frac{1}{16}$ in.	$2\frac{5}{8}$ in.	542 lbs.	4 in.	$1\frac{3}{8}$ in.	3	$1\frac{1}{8}$ in.	582 lbs.
24 "	$26\frac{7}{8}$ "	do	$1\frac{1}{16}$ "	$1\frac{3}{4}$ "	$2\frac{1}{4}$ "	370 "	$3\frac{3}{4}$ "	$1\frac{1}{4}$ "	3	1 "	406 "
20 "	$22\frac{7}{8}$ "	do	$1\frac{1}{16}$ "	$1\frac{3}{4}$ "	$2\frac{1}{4}$ "	316 "	$3\frac{3}{4}$ "	$1\frac{1}{4}$ "	3	1 "	352 "
16 "	$18\frac{5}{8}$ "	do	$\frac{7}{8}$ "	$1\frac{1}{2}$ "	$1\frac{7}{8}$ "	205 "	$3\frac{1}{2}$ "	1 "	3	$\frac{3}{4}$ "	234 "
12 "	$14\frac{1}{2}$ "	do	$1\frac{3}{16}$ "	$1\frac{5}{16}$ "	$1\frac{11}{16}$ "	145 "	3 "	1 "	3	$\frac{3}{4}$ "	170 "
10 "	$12\frac{1}{4}$ "	do	$1\frac{1}{16}$ "	$1\frac{3}{16}$ "	$1\frac{1}{2}$ "	103 "	$2\frac{1}{2}$ "	$\frac{7}{8}$ "	3	$\frac{5}{8}$ "	122 "
8 "	$10\frac{1}{8}$ "	do	$\frac{5}{8}$ "	$1\frac{1}{16}$ "	$1\frac{5}{16}$ "	76 "	$2\frac{1}{2}$ "	$\frac{7}{8}$ "	3	$\frac{5}{8}$ "	95 "
6 "	8 "	9 in.	$\frac{9}{16}$ "	$\frac{7}{8}$ "	$1\frac{1}{8}$ "	48 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	2	$\frac{5}{8}$ "	62 "
4 "	$5\frac{7}{8}$ "	do	$\frac{9}{16}$ "	$\frac{7}{8}$ "	$1\frac{1}{8}$ "	36 "	$2\frac{1}{2}$ "	$\frac{3}{4}$ "	2	$\frac{5}{8}$ "	50 "
3 "	$4\frac{3}{4}$ "	do	$\frac{7}{16}$ "	$\frac{3}{4}$ "	$1\frac{5}{16}$ "	24 "	$2\frac{1}{4}$ "	$\frac{5}{8}$ "	2	$\frac{5}{8}$ "	33 "

TABLE OF DIMENSIONS OF FLANGE PIECES. (See Fig. 6.)

Internal Diameter of Pipe.	Thickness of Pipe.	Thickness of Flange Finished.	Outside Diameter of Flange.	Diameter of Bolt Circle.	Number of Bolts.	Diameter of Bolt Holes.	Diameter of Bolts.	Length of Bolts.	Distance A.	Radius R.
30 inch.....	$\frac{7}{8}$ in.	$1\frac{1}{4}$ in.	$37\frac{1}{2}$ in.	$34\frac{1}{2}$ in.	20	1 in.	$\frac{7}{8}$ in.	4 in.	25 in.	7 in.
24 "	$\frac{3}{4}$ "	$1\frac{1}{8}$ "	31 "	$28\frac{1}{2}$ "	16	$\frac{7}{8}$ "	$\frac{3}{4}$ "	4 "	22 "	7 "
20 "	$\frac{3}{4}$ "	$1\frac{1}{8}$ "	27 "	$24\frac{1}{2}$ "	16	$\frac{7}{8}$ "	$\frac{3}{4}$ "	4 "	20 "	7 "
16 "	$\frac{5}{8}$ "	$\frac{7}{8}$ "	$22\frac{1}{2}$ "	20 "	12	$\frac{7}{8}$ "	$\frac{3}{4}$ "	3 "	17 "	6 "
12 "	$\frac{9}{16}$ "	$\frac{7}{8}$ "	18 "	$15\frac{3}{4}$ "	8	$\frac{3}{4}$ "	$\frac{5}{8}$ "	$2\frac{1}{2}$ "	14 "	5 "
10 "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	16 "	$13\frac{3}{4}$ "	8	$\frac{3}{4}$ "	$\frac{5}{8}$ "	$2\frac{1}{2}$ "	12 "	4 "
8 "	$\frac{7}{16}$ "	$\frac{3}{4}$ "	13 "	$11\frac{1}{8}$ "	8	$\frac{3}{4}$ "	$\frac{5}{8}$ "	$2\frac{1}{2}$ "	10 "	3 "
6 "	$\frac{3}{8}$ "	$\frac{5}{8}$ "	11 "	$9\frac{1}{8}$ "	4	$\frac{3}{4}$ "	$\frac{5}{8}$ "	2 "	8 "	3 "
4 "	$\frac{5}{16}$ "	$\frac{5}{8}$ "	9 "	$7\frac{1}{8}$ "	4	$\frac{3}{4}$ "	$\frac{5}{8}$ "	2 "	6 "	2 "
3 "	$\frac{5}{16}$ "	$\frac{1}{2}$ "	$7\frac{5}{8}$ "	$5\frac{5}{8}$ "	4	$\frac{5}{8}$ "	$\frac{1}{2}$ "	2 "	5 "	2 "

Studies in Matters Allied to Gas Purification.

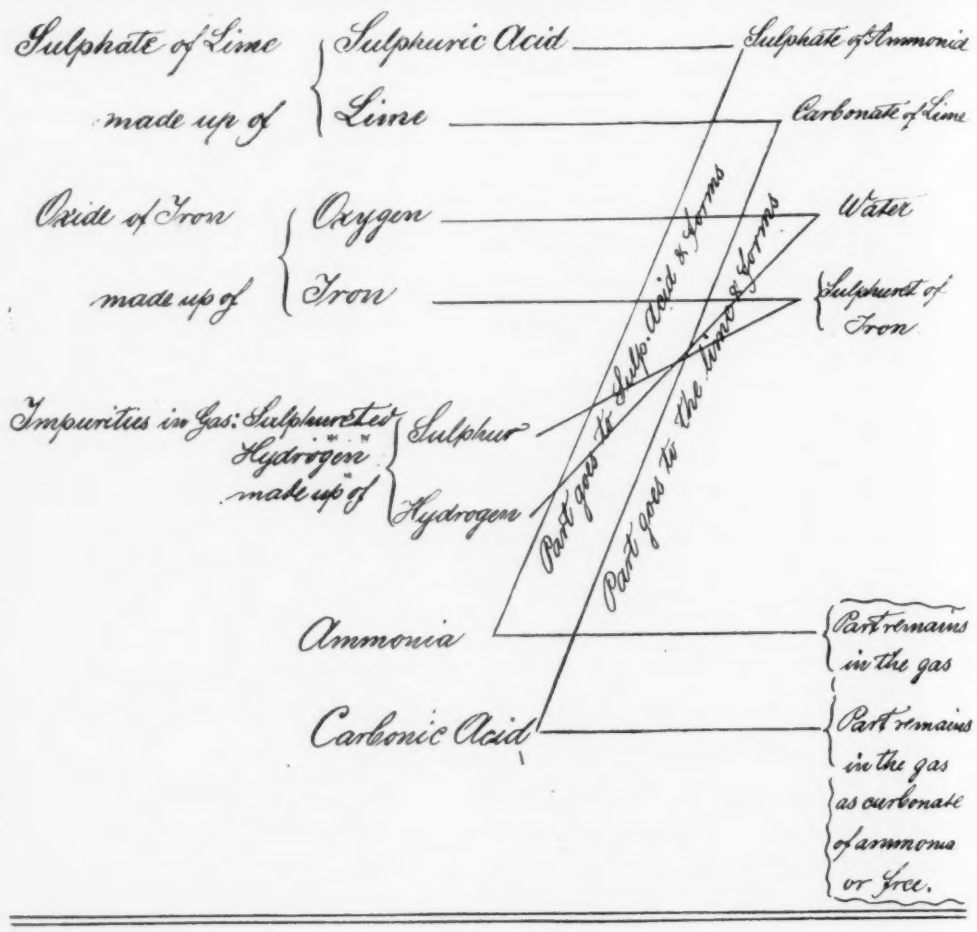
STUDY No. I.—Prepared by "W. E. F.," Boston, Mass.

Whether I attend the meetings of the Gas Engineers, in Boston, or am prevented (as I was in February last) by illness, I always am interested in reading your reports thereon. I noticed particularly in a recent JOURNAL the report of the papers* on "Oxide Purification," and the discussions as to the use of mixing lime with the sawdust and copperas. I have had many an argument with an old friend, a gas engineer, on this subject, and have always maintained that the lime *was* of service, and I never mix any "sponge" without it. I am tempted to send you the chemical reaction, both of the purifying of the gas and the revivifying of the oxide, as I have never seen it in any issue of the JOURNAL, nor in any of the ordinary books on gas making. In face of this, I do not see how any one can argue that the lime is useless; but I am "open to conviction."

Mixing lime and copperas, or sulphate of iron, we get our purifying mass of { Sulphate of lime and oxide of iron.

Putting this into our boxes and passing impure gas through it we have this chemical reaction: (See diagram.)

And here we have just what we put into our boxes, namely, *sulphate of lime and oxide of iron.*



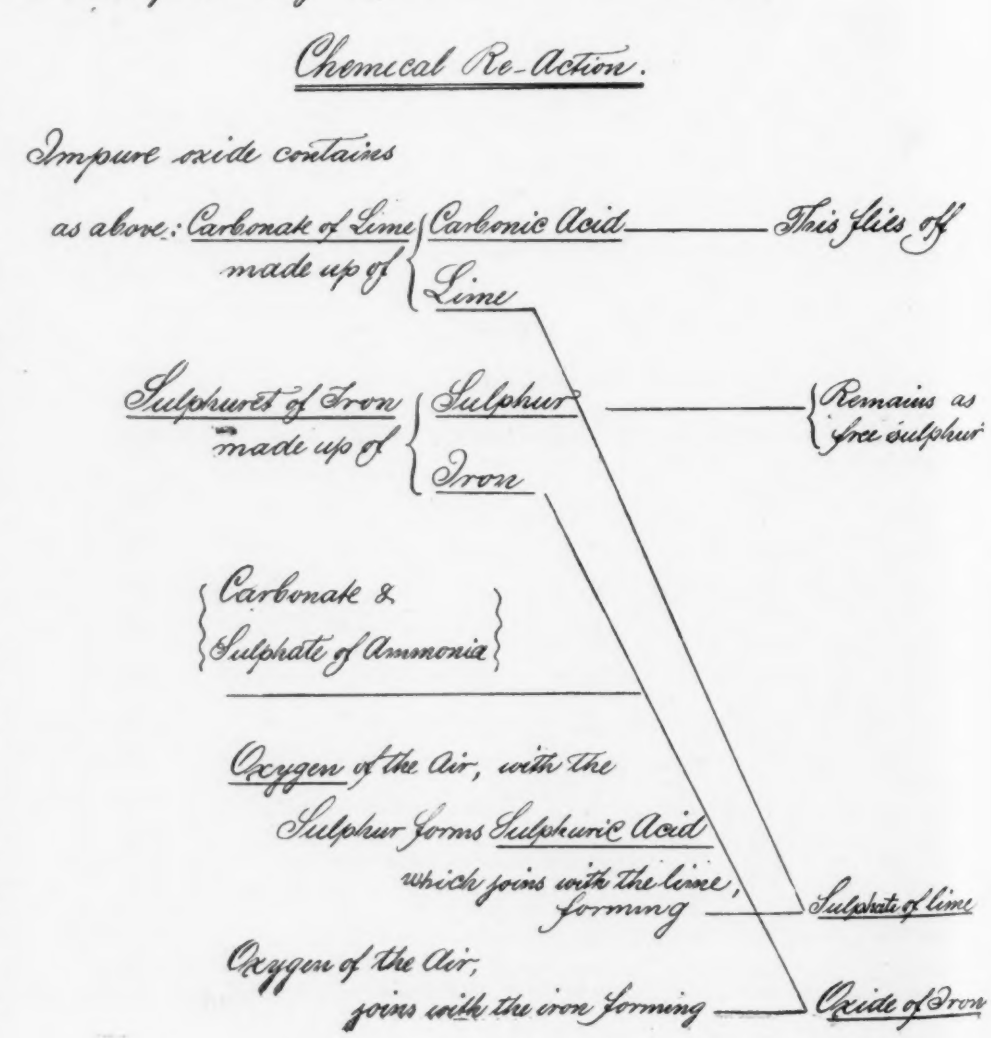
STUDY No. II.—Prepared by MR. ALTEN S. MILLER, of the Omaha (Neb.) Gas Mfg. Company.

I read with great interest Mr. Jenks' paper on "Oxide Purification," which was published in your issue of March 21st. I was especially interested in the point referring to the loss of illuminating power due to turning on a box of revivified oxide, for my experience has been similar to his. The oxide in use in Omaha is made of clean cast iron borings and planer chips, the former being oxidized with a solution of sal ammoniac and copperas. Some has been in use a little over a year, and has purified about 50,000 cubic feet per bushel, of 2,150.42 cubic inches.

At first the oxide had no effect on the illuminants of the gas, as far as we could tell, but of late, when a box is turned on, there is a marked fall in the candle power. Four hundred and forty bushels of oxide reduce over 100,000 cubic feet of gas 2 or 3 candles.

A press of other business has prevented my giving this subject much attention, but the conclusion I came to was that the illuminants had united with the free sulphur mixed in with the oxide. It seems to me to be the only explanation possible.

How many gas makers test the quality of the gas between the purifiers and the holder; and how many can state positively whether revivified oxide does or does not affect the illuminating power of the gas?


In Revivification by Exposure to Air we have this
Chemical Re-Action.
Impure oxide contains
as above: Carbonate of Lime made up of
Carbonic Acid
Lime
This flies off
Sulphuret of Iron made up of
Sulphur
Iron
Remains as free sulphur
Carbonate & Sulphate of Ammonia
Oxygen of the Air, with the Sulphur forms Sulphuric Acid which joins with the lime, forming
Sulphate of Lime
Oxygen of the Air, joins with the iron forming
Oxide of Iron

* See JOURNAL, March 21, 1892. "Manipulation of Oxide" (p. 393), by Mr. W. A. Wood, of Boston; "Oxide Purification" (p. 399), by Mr. Z. M. Jenks, of Woonsocket, R. I.

[Prepared by Mr. John W. Truesdell, Treasurer of the Homer and Cortland (N. Y.) Gas Light Co., and read before the Society of Gas Lighting by Mr. Austin C. Wood, of Syracuse, N. Y.]

Coal Gas Versus Electricity.—What do We Pay? and What do We Get For Our Money?

The question uppermost in the mind of every consumer of gas or electricity for lighting purposes is, "What is the relative cost and comparative quality of each?" or, in other words, "Light for light, which is the cheaper of the two?"

Some interesting statistical facts bearing upon this important subject may be gleaned from the Seventh Annual Report of the Board of Gas and Electric Light Commissioners of the Commonwealth of Massachusetts, issued in January, 1892. The average relative cost of producing gas or electricity for lighting purposes is not given in the report; nor can it be ascertained with any degree of accuracy, even by experts in the business, as the cost in each case is governed by the location of the works, the capital invested, the annual output, etc., etc.; but what the public may easily ascertain is the *exact price paid by consumers*, which is embodied in the report referred to, the minutest details of which are given under sworn statements, by the managers of every company doing business within the borders of the State.

The facts thus brought out are of great value to the public, for the reason that both gas and electric light plants are now to be found occupying the same field in most towns throughout the State. Therefore, it may be safely assumed that by such competition the selling prices hereinafter quoted are as low as can be expected, consistent with fair returns for the capital invested.

Electricity.—The incandescent system of electric lighting being the only system that can now be practically introduced within doors and in private dwellings, thus competing to any large degree with gas light is, therefore, the system to be herein considered.

The Commissioners' report shows that of the 83 electric light companies now operating in the State, the average price paid by consumers is 1.19 cents per hour for a 16-candle incandescent light.

Where meters are not used the average contract price, based upon 1,000 hours' use per year, is $11.74 per lamp of 16-candle power.

Gas.—By the same report it will be seen that the average price of illuminating gas to all consumers in the State, is below $1.40 per 1,000 cubic feet; but if we exclude from the list the several gas companies, manufacturing each not less than 35 million cubic feet per annum, we find that the average price paid by consumers is about $1.80 per 1,000; while, if we exclude 25 gas companies manufacturing annually 30 million feet each, the average price to the balance of consumers throughout the State will be raised to $1.96 per 1,000 feet.

Taking $1.80 as a fair average price paid by consumers of gas in all towns of from 10 to 20,000 population, and one cent per hour for 16-candle power incandescent electric light, or $10 per annum per light—the lowest contract price, with but three or four exceptions, within the State—and we are able to produce the following comparison:

First—A 4 foot gas burner which gives continually 16 candles of light, as measured by the photometer, will consume, in 1,000 hours actual use, 4,000 cubic feet of gas, which, at $1.80 per 1,000, will cost the consumer $7.20.

Second—A 16-candle incandescent and electric light for the same period (1,000 hours per year) by meter measurement, at one cent per hour, will cost the consumer $10, showing a decided difference in price in favor of gas, even assuming that the lights are equal in candle power during the entire year.

It will be readily seen, however, that while the incandescent lamp, which, on first lighting, generally yields its full, registered 16 candles of light, cannot, from the very nature of its construction, hold good for even a day. It immediately begins to slowly but surely deteriorate in power until its life is spent—500 hours' of actual use, or two renewals per year of 1,000 hours, represent both its theoretical and practical life.

This rule of deterioration in lighting power must invariably apply to all incandescent electric lamps, until some method is discovered by which a cheap, transparent *perfect vacuum* can be made and maintained for an indefinite period, within which may be placed a practically indestructible carbon.

Crucial tests made repeatedly in various parts of the world by the aid of the photometer, which measures the volume of light more accurately than the most experienced eye, reveal the patent fact that the average lighting power of a 16-candle incandescent lamp, recorded every day of its life, is really but 8 candles of light.

Thus it will be seen that when we measure the cost of both systems, comparing them light for light, we have 8 candles of incandescent light for a year of 1,000 hours, at a cost of $10, while the same amount of gas light can be had for $3.60, showing the relative cost of light at the prices above stated as $36 is to $100.

But when we compare the cost of light based upon the actual sales to all consumers throughout the State, as shown in the Commissioners' Report, *i. e.*, $1.40 per 1,000 cubic feet for gas and $1.19 per hour, or $11.74 per annum of 1,000 hours, for a 16-candle incandescent electric lamp, the relative cost, light for light, stands as *one is to four.*

The Commissioners give emphasis to the fact that the meter system of measuring both gas and electric light is the only equitable system by which either can be sold; therefore, whenever manufacturers are forced to sell by time measurement they expect no economy on the part of purchasers and invariably put up the price to meet extravagant consumption. Thus the consumer who contracts to pay $10 each for 10 incandescent lights is sure to part with $100 per annum, whether he consumes the full 1,000 hours of time or not; while the gas consumer, who can, if he desires, get the same quantity of light for $36, may, by the exercise of a little economy during dull periods, reduce his gas bills very much below this sum.

Conclusion.—What grand improvements there are in store for us in the future, by which artificial light may be increased in power and cheapened in price, no one can foretell; but, until owners of electric light plants attain such perfection in the art of manufacture that they can profitably sell to their consumers at a reduction of 75 per cent. from their present average rates, gas manufacturers need have no fear of being driven from the field.

[A paper read before the Eastern Counties Gas Managers Association.]

Consumers' Fittings.

By Mr. J. H. Troughton.

The subject I have chosen to bring before you is one which has not been discussed before by this Association; but it is constantly coming before us in our respective localities. Consequently it is nothing new; but I think it is of sufficient importance to give rise to a profitable and interesting discussion.

At one time it was considered by the majority of gas managers that, when a good supply of gas had been laid on to a customer's premises, and a meter of sufficient capacity for his requirements fixed, we had done all that was necessary so far as we were concerned; and the remaining and most important part of the work was left to the tender mercies of someone else, who might continue the good work we had begun, and give satisfaction, or who might continue the work and give general dissatisfaction, by putting in pipes utterly inadequate to convey sufficient gas to the various points of combustion—thus at once crabbing and crippling the supply we fondly hoped our customer would obtain.

Our efforts to satisfy our customers must always be more or less handicapped, while we labor under the disadvantages of having the internal fittings done by irresponsible tradesmen and unqualified fitters. We are too much in the hands of gas fitters who are not up to their work, and who know little or nothing as to what are the sizes of pipes necessary to properly fit up a house. The fitter may be a moderate workman, but he lacks the idea; and it is astonishing what a volume of gas some of these fellows expect a ½-inch or ¾-inch pipe to convey. I have actually known a so-called "fitter" lead off from the outlet of a 50-light meter with a ½-inch pipe, intending it to supply sufficient gas for between 50 and 60 burners.

But it is not always the gas fitter who causes us trouble, and our customers inconvenience. It sometimes occurs that architects are the cause of these reprehensible blunders; for they do not always specify pipes large enough for the number of burners required. I have had to condemn fittings for this reason, and to refuse to fix the meter until the defect was remedied. A fruitful source of mischief arises from contract work; for there are few things easier to be scamped than internal pipes. Then we have the "jerry-builder," who scamps everything, and the gas fittings in particular; putting in the cheapest trash he can get, without the slightest consideration of quality or capacity—the work being abominably done. Next to his tenants, I think the gas manager is most to be pitied; for the result of the builder's short sighted economy leads to dissatisfied customers, who are continually sending urgent requests for a fitter to stop some dangerous leak, or annoying us with complaints of insufficient light, and of "bad gas," which is generally produced by their own defective and shoddy fittings. These are a few of the many drawbacks we have to contend against; and to give in detail the many glaring and inexcusable blunders which undoubtedly exist to-day in almost every town supplied with gas, would be a waste of time, as we are all more or less acquainted with the causes I have mentioned. For-

tunately, something has been done of late to remedy and guard against this unsatisfactory state of things; but there is a great deal more to be done before we can hope to dispose of the evils arising from defective and inadequate gas fittings.

It has been said that the subject of internal fittings is beyond the province of the gas manager, and that we have quite enough responsibility without increasing it. With this I quite agree. But whether or not we are willing to accept this extra work, we shall have to submit, because it is being slowly but surely forced upon us; and I think the sooner we grapple with it, the more likely we are to come to some practical conclusion as to what is the best way to deal effectually with this important problem.

When we come to consider ways and means of surmounting and overcoming the many defects caused by leaving this work for others to do, we encounter obstacles at all points; for what would be a success at one place would not be practicable at another. Some companies undertake to fit up houses complete, supplying everything and charging cost price for the work done. Others have adopted the plan of doing the work complete on a three-years' system. The scheme introduced by Mr. Valon, at Ramsgate, seems to be a very successful one, and worthy of imitation. He told us at our Cambridge meeting, that, by fitting up houses of a rateable value of £30 and under free of charge, he had tapped a class of customer which only a similar plan would be likely to obtain. In return for free fittings, Mr. Valon charges 7d. per 1,000 cubic feet over the rate charged to ordinary customers. This, it is estimated, will pay for the fittings in 5 years. They have at Ramsgate above 500 of these customers, who consume, on the average, about 10,000 cubic feet of gas per annum; and, being supplied on the prepayment system no bad debts are incurred.

These schemes are very commendable and steps in the right direction. But I fear they would be too difficult to carry out by many small companies in the Eastern Counties; for in the first place we should have the local gas fittters to deal with, and this is no congenial task to set ourselves, because they already look with envy on gas companies, and the first move we make toward interfering with what they call their private business, would be looked upon as an encroachment, and in all probability strongly resented. Then small companies are not always so fortunately situated with regard to capital as larger companies and corporations may be. An extra skilled fitter would be required, whose wages would be necessarily high; and an additional workshop, and perhaps a show room in the town, with an attendant, would be necessary; so that only large or medium-sized concerns can adopt these schemes with advantage. But we can all do something towards limiting, if we cannot overcome, the many defects which from time to time come before our notice; and especially should we be alert at the present time, when we have so much competition to contend with in so many various forms. The electric light has not done us any harm in the Eastern Counties; and we need not look upon it as a very serious rival at present. But we have a far greater competitor in oil, which is extensively used not only as an illuminant but for heating and other purposes. We have, therefore, every reason to be jealous of its presence among us; and nothing should be left undone until we can compete successfully with any rival which may cross our path, by adopting such plans as will tend to bring gas within the reach of all.

Something might be done at the outlet of the meter. It is here that the most important part of distribution commences; and I think it is here that we require some power or authority to fix upon, and adopt, a standard size of pipes suitable for dwellings and other buildings, so that, whether or not we undertake internal fitting work, we can, at least, see that our customers will have a system of pipes put into their premises which will insure them obtaining a supply of gas at whatever point it may be required. The sanitary arrangements of new buildings are carefully looked after by inspectors; and unless pipes of suitable size and quality are laid, with a proper fall, and trapped to their entire satisfaction, they have power to condemn the whole system according to the law. Water companies, too, have similar powers; and I cannot see why gas companies should not have some additional facilities, to enable us to prevent the abuse of the light we manufacture and convey to our customers' dwellings, if not for their health, at least for their happiness and comfort. Personally, I should like to see our Association take up this matter, and adopt a standard of sizes, for, say, the skeleton part of the internal fittings of a house. I am confident much good would be the result, if only a united and persistent effort were made to carry it out when adopted; and I think we should be doing something which would help those of our members, who, from no fault of their own, are unable to undertake the responsibility of doing the whole of this work, at the same time performing a duty we owe to our customers as well as to ourselves, which would tend very materially to popularize the use of gas, and diminish to some extent those annoying and irritating complaints which cause us so much trouble. If this were done, managers would be consulted more by present and intending customers, and be in a position to insist upon internal pipes of a proper capacity being put into their premises.

Some time ago the North British Association appointed a special committee to fix upon a standard size of pipes for internal fittings; and the result was that they recommended the following:

Internal Diameter of Pipe. (Inches.)	Greatest Length of Pipe Allowed. (Feet.)	Greatest Number of Burners for Size and Length of Pipe.
⅜	20	3
½	30	6
⅝	40	12
¾	50	20
1	70	35
1¼	100	60
1½	150	100
2	200	200

No ¼-inch pipe to be used.

I may say that at Newmarket I adopted these recommendations, with beneficial results. I had the scale printed, with other rules and information, in circular form, and distributed them among our customers; and whenever I see any buildings or alterations going on, I send a copy to the architect, builder and owner, and have generally found that the information given has been acted upon. I can with confidence recommend the above scale to those who cannot do more than advise their customers on this subject. Where gas stoves are used, or intended to be used, the internal diameter of the pipes should be at least ¼ inch larger; and in any case it is advisable to allow for them, for I have often lost the chance of placing both cooking and heating stoves, on account of the trouble which would be caused by enlarging the pipes, even when the work would have been done free. We let gas cookers on hire at Newmarket, and fix them free to customers who are willing to keep them a year, or we sell them and heating stoves at a little above cost price. I cannot state the number of stoves we have in use; but during the summer months our day consumption of gas is as near as possible equal to the night consumption. With regard to tubing for internal fittings, that only of the best quality should be used. I prefer iron to lead or composition, as it is not liable to bend or to be nailed through.

There is also plenty of scope to improve upon the old-fashioned chandeliers and wall brackets which are still to be seen in our towns; and in fitting up new buildings, care should be taken to have these of good quality, and not altogether devoid of ornamentation, for they can be substantial as well as artistic, and are obtainable at very reasonable prices. With such a great variety of gas globes to select from, it is a difficult task to say which is best; but only those with large openings at the bottom should be recommended. Globes with narrow openings cause the light to flicker; and it would be well if these objectionable things were abolished. It is a mistake to have deeply tinted or painted globes, which often obstruct from 10 to 50 per cent. of the light. I prefer those which are nearly clear, though it is somewhat fashionable now-a-days, where the maximum of light is not the chief object in view, to have them deeply tinted. Of burners there are all sorts and conditions. Those of a corrodible material should never be used; yet it is strange that the "burner man," who still pays periodical visits to many of our towns, can find a ready sale for these antiquities, at very remunerative prices. I have known people pay 6d. to these men for the commonest burner imagainable; and, on account of the cost, prefer to use it in preference to a good governor burner given to them gratis. I strongly recommend the governor type, and always recommend burners of the best quality. I have found it a good policy to give samples away to any consumer applying for them, as well as small boiling stoves, and to send a fitter to fix them and to attend to any little defect, free of charge. These little services tend to create a spirit of contentment among consumers, and cannot fail to do good.

There can be no doubt that the time has come for gas companies to take a greater interest in the distribution of gas beyond the meter, and those who do so will doubtless benefit both themselves and their consumers; and, with this object in view, at Newmarket we have decided to undertake the whole of the distribution from the meter to the point of consumption.

In conclusion, it is needless for me to say that I have not touched upon many of the details and little defects which are inseparably connected with this broad subject. But I do say that it deserves more attention than it usually gets; that we should exercise more supervision

over consumers' fittings; and that we should no longer hesitate about tackling, in a systematic manner, what has been termed the greatest "bugbear" we have to contend against in the way of selling gas.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

On May 1, the offices, warerooms and shops of the American Meter Company's Chicago department will be removed from Nos. 244–246 North Wells street to Nos. 125–127 South Clinton street.

Mr. J. R. Cullinane, Secretary and Superintendent of the Denison (Texas) Light and Power Company, is up and doing, having been authorized by his President (Mr. W. B. Munson) to arrange the necessary contracts that will eventuate in the erection of a brand new 10-inch plant. The Company will build anew from stem to stern—buildings and apparatus. We congratulate Mr. Cullinane and the Company on the excellent business done last year, and we have no doubt that the new plant, which will be completed in ample time for the demands of the next winter season, will fairly boom trade in gas at Denison, in the Fair year. Last year Mr. Cullinane put out 68 appliances for using gas for purposes other than lighting.

We cordially assent to an opinion promulgated a few days ago by the proprietors of the *Industrial World*, who said: "It is sometimes said that scientific men never invented anything, but this is not true of the late Dr. Otto, who is known all over the world as the inventor of the first economical and commercially successful gas engine."

The capital stock of the Belleville (Ills.) Gas Light Company has been increased to $150,000 from $100,000.

The Berlin Iron Bridge Company, of East Berlin, Conn., has taken the contract to build a producer building for the Solvay Process Company, of Syracuse, N. Y. The building will be 30 feet wide by 100 feet long and three stories high, and is to be built entirely of iron—even the floors being made of plate iron—in order that the danger from fire may be virtually nothing.

A correspondent, writing in this city, under date of the 14th inst., over the signature, "Fourteen Years a Gas Inspector," says: "In reference to the paper* read by Mr. A. F. Nash, before the members of the Ohio Gas Light Association, on 'The Prevention of Errors in Reading Meters,' and the remarks of Mr. Lathrop in opening the discussion, Mr. Nash made a suggestion as to where meters should be placed. We all know where we would place them could we have our way; but 99 per cent. of the consumers have their meters fixed in the most out-of-the-way spot they can select, and we must accept it and take them, whether in a parlor or in a dark hole. Mr. Nash did not say whether it was the handsome walnut box or the hard maple panel door that inspired his consumer to read the meter. It is a fact that not one in a thousand consumers can read the index of a meter correctly. Why, sir, the percentage of errors in comparison to the number of indexes taken is so infinitesimally small that it was not worth the time of the Association to discuss it. Mr. Lathrop says it is a pretty hard thing to tell how to prevent errors, and thinks that nothing but a strictly honest and accurate reader can prevent them. Exactly so! It is a pity he did not go further and say: Give a reader only a fair number of meters to read in a day 150 to 200 instead of from 250 to 350, as now, and remunerate him fairly for it; he could then devote more time to his task. Mr. Lathrop also does not allow his readers the route book, because they cannot make a mathematical calculation. Shades of Bishop Colenso! So we that know that 1,000 feet at $1 is 10 cents per 100 feet, and 1,000 feet at $1.25 is 12½ cents per 100 feet are mathematicians! We must really thank Mr. Lathrop for placing us upon such an exalted level. Only fancy! Mathematicians working for a paltry $2 and $2½ a day. We must reconsider our positions. Give the meter reader the route book. Why, sir, Mr. Lathrop in withholding it is the very cause of errors occurring. A glance at the corresponding month's consumption would inform the inspector if he had over or under-read the index. If there were any perceptible discrepancy he would verify the index before leaving the house. His comment is a slur upon the veracity and intelligence of the whole body of meter inspectors. 'Guessing' may be done by Chicago students, but not by honorable men, whose avocation is their family's bread and butter. Mr. Allen hits the right nail on the head exactly. We must keep an unruffled and courteous demeanor in the face of all he describes; otherwise you hear in a day or two that a letter has arrived at the office, with four crammed pages complaining of the 'impertinence of the gas man.' In conclusion, to reduce errors to a minimum, give the inspector a route book, with not more than 200 in it. Every consumption should be compared with the corresponding month's consumption of the previous year, and if any great discrepancy exists, verify the index and mark in the margin 'correct,' for the bookkeeper's information. I consider that Mr. Lathrop's remarks are most unfair and unjust, and should not be allowed to pass unchallenged."

*See Journal, April 11, 1892, p. 524.

A most vexatious suit to the proprietors of the Oakland (Cal.) Gas Company is that brought by "Doctor" C. S. Lane against Dr. Tisdale. Some time ago we noted that the Company had purchased from several owners parcels of land—some of which were built over—on and about the corner of Clay and 13th streets, with the purpose of erecting thereon an imposing office building. The Company, presuming that the titles and agreements to the property were all perfect, was about to tear down the old buildings, when it was confronted with the proceedings entitled Lane vs. Tisdale. It seems that Dr. Tisdale, in whom title to a certain portion of the plot was vested, had, sometime before the sale, leased the house to "Doctor" Lane, and the latter avers that he, acting in partnership with his wife, expended $1,000 "and over" in fitting the house for "better and safer and more advantageous carrying on of their business, which expenditure has not been requited by defendant." The oddest part of the Lane partnership is the affirmation that "he" is a dentist, while the "she" portion of it is a "medical doctor." Of course, the only concern of the Oakland Company in the affair is the delay occasioned by the disagreements of the "doctors."

That death often strikes a double blow is most unhappily illustrated in the again bereavement of Mrs. John Andrew, of Chelsea, Mass., who now mourns for the loss of her son, Mr. Walter H. Andrew, Assistant Superintendent of the Chelsea Gas Company, whose death occurred at Chelsea on the evening of the 9th inst. Deceased, who was in his 30th year, was a young man of much promise. [Since this was written we are informed that Mrs. John Andrew has passed away.]

Messrs. Deily & Fowler, of Philadelphia, will erect the holder that the Lynn (Mass.) Gas and Electric Company is about to put in the tank that held the holder which was wrecked last month during a severe gale from the Northwest. Mr. Prichard has determined to inclose the new holder in a brick house. Its capacity is to be 300,000 cubic feet, and it will be in 2 lifts of 20 feet each. The diameter is 100 feet.

In our last we noted that Mr. Adam Weber had been awarded the contract for the erection of 20 benches of 6's, at the works of the San Francisco (Cal.) Gas Light Company, to be fired with the new recuperative Weber furnaces. It should have read "20 benches of 9's." The mistake, however, was in the notification forwarded by Mr. Weber.

At a special town meeting, held at Stoughton (Mass.) on the 12th inst., it was voted to exercise the authority conferred in Section I., of chapter 370 of the acts of the year 1891, to purchase, lease or establish and maintain one or more plants for the manufacture or distribution of gas or electricity, or both, for furnishing light for municipal use and for the use of such of its inhabitants as may require as provided for in said act. The vote was, 105, in favor; in opposition, 8.

An item from Marblehead, Mass., reads: "The Marblehead Gas and Electric Light Company is making an extension of its mains to Clifton. Last season the Company connected with the Lynn main at Swampscott and then, extending to Clifton, supplied that locality by purchasing gas from the Lynn Gas Company. Connections have been made at Ocean street now and the main will be laid along Atlantic avenue to connect with that laid last season. When the line is completed, Cliftonites will use gas manufactured at Marblehead."

The improvements at Nantucket will be completed about June 1st, and when the work is finished the Company will be in position to send out 60,000 cubic feet per diem.

The plants and franchises of the Austin (Texas) Water, Light and Power Company have been purchased by a syndicate of capitalists, a portion of the investment being made by Eastern capitalists. Reorganization was effected as follows: President, Joseph Nalle; Vice-President, M. D. Mather; Secretary and Treasurer, De Lacey Wickes; Directors, Joseph Nalle, M. D. Mather and Edgar J. Nalle, of Austin; Samuel B. Huey, of Philadelphia; and Wm. Checkley Shaw, of Baltimore.

THE Dayton (O.) Gas Light and Coke Company will put up an additional holder on the plot, corner Monument and Mill streets. And this is not far from what was a famous natural gas district.

SOME days ago, during the continuance of a thunder storm at Colorado Springs, Colorado, a flash of lighting travelled over an electric lighting wire of the Lowe Gas and Electric Company, and eventually fused a gas service in the Companys office. The escaping gas was ignited and an alarm of fire brought the fire company to the place. The flames were subdued before any material damage was done.

THE Wilkes-Barre *Record*, of April 18th, speaking of the proposed new West Side Gas Company, says: "Our advertising columns yesterday contained a notice that application would be made to the Governor of the State of Pennsylvania, on Saturday, April 30th, for a charter for a corporation to be known as the West Side Gas Company, the purpose of which is to manufacture gas for illuminating purposes only in the boroughs of Kingston, Dorranceton, Edwardsville, Forty Fort and Luzerne. The incorporators are Abram G. Hoyt, John B. Yeager, J. J. Robbins, A. J. Roat, Henry Yeager and John Flannagan. A *Record* reporter, in an interview with A. J. Roat, one of the incorporators, learned the following facts in connection with the enterprise: The proposition was broached some time ago and arrangements have been quietly making, but the announcement in the *Record* a few days ago that the Wilkes-Barre Gas Company intended laying a main across the river awakened the West Side Company and brought matters to a head with it. A meeting was immediately called and Abram G. Hoyt was elected President and Henry Yeager Secretary. The capital stock is to be $50,000, 10 per cent. of which has already been paid in. Mr. Roat said that it was proposed to put in the very latest approved machinery, to make the best gas possible, and to sell it as cheaply as would warrant a decent return on the investment. Active work will be begun just as soon as the charter is secured. Piping of the outside towns will begin as soon as permission is granted by the several Borough Councils. The plant will be located near the Borough line separating Kingston and Dorranceton."

ABOUT a fortnight ago the Trustees of Dundee, Ills., a pretty town in Illinois some 5 miles north of Elgin, otherwise known to the fraternity as Brother Fitz's bailiwick, granted to the incorporators of the Dundee Electric Light Company an exclusive franchise to erect and maintain an electric plant, "for illuminating, chemical and mechanical purposes," for the term of 20 years, the Company to furnish without cost to the corporation electrical current for the lighting or illuminating of its chamber and fire department building. The corporation also reserves the right to buy the plant at a fair valuation at any time the Board may elect, at which time each party may appoint one arbitrator, and they a third, to arrange such transfer. The Company is to furnish incandescent lamps at a price not to exceed 9 mills per hour for 16-candle power lamps, or lamps of higher candle power at a proportionate rate, and 1,200-candle power arc lamps are to be furnished at a price not to exceed $6 per month, for 11 o'clock service, and 2,000-candle power for $8. Within six months from the date of the franchise the Company must accept in writing and commence work thereon within six months from the date of acceptance. The incorporators are E. C. Hawley and the Oatman Brothers.

THE Salt Lake (Utah) Power, Light and Heating Company has notified those who light their residences by electricity that after May 1 the service will be carried on by meter measurement, and that no contracts will be made. A deposit of $12.50 must be made for the meter, which deposit is to be returned when the service is discontinued. The consumer must pay the cost ($2.50) of putting in the meter.

GUS. A. TEMPLE, the proprietor of a hardware shop on Market street and Jefferson avenue, St. Louis, was recently bound over for the grand jury, in the criminal Court of Correction, under a bond of $500. According to a local account he is charged with stealing electricity from the Missouri Electric Light Company, which supplies currents to its consumers from meters. It is alleged that Temple put a "jumper" wire across the meter in his store to prevent the electricity from entering the register, thus preventing the meter from registering other than a small per cent. of the current actually consumed. The value of the current "stolen" amounted to only $3.20, but the Company was anxious to make a test case of it. Temple's attorney put up the defense that the alleged offense could not constitute larceny, as electricity was not property and could not therefore be stolen. Authorities were cited to show that gas, which it was claimed was a similar substance, was considered personal property by law, and it was, therefore, a larceny to steal it. Temple's attorney then claimed that if any offense was committed by defendant it was attempted fraud, and not larceny. The State accepted this view of the affair, whereupon Temple was bound over for that offense, which is also a felony.

THE people of Medina, Ohio, have voted to bond the city for the purpose of constructing and maintaining a municipal electric lighting plant. The poll comprised 461 votes, of which 355 were in the affirmative.

THE City Council of Wilmington, Ohio, after some discussion, has awarded to the Fort Wayne (Ind.) Electric Company a contract for furnishing an electric lighting plant, to be operated on account of the municipality.

AT the annual meeting of the Rochester (N. Y.) Gas Company the following result was reached: President, M. F. Reynolds; Vice-President, William Runkle; Secretary and Treasurer, H. G. Runkle; Manager, W. L. Cole; Directors, M. F. Reynolds, William Runkle, R. A. C. Smith, T. F. Wood, J. Brackett, W. E. Stiger, J. H. Harris and W. S. Kimball. The annual reports disclosed a most satisfactory state of affairs in the Company's business. On the evening of the election the officers and Directors were the guests of Mr. Wm. E. Kimball, at the Genessee Valley Club.

WE are indebted to the courtesy of Mr. William C. Adams, Superintendent of the Richmond (Va.) City Gas Works, for a line or two informing us that we were in error in stating last week that the Council Committee on Light had ordered new mains to be laid through Main street. The only pipe changes arranged for by the Council so far this year are those which provide for the extension of the mains to districts where new buildings have been erected, the occupants of which propose to use gas.

WRITING of this brings up the fact that the Richmond Board of Aldermen, at the last meeting, appropriated $25,000 for the erection of a water gas plant, to be used as an auxiliary to the coal gas plant. The resolution goes to the Council meeting to be held next month. Should the concurrence of that body be obtained, which is more than likely, the measure will become a law.

A FEW days ago some of the workmen employed at the Calf Pasture station of the Boston Gas Company notified the Superintendent that unless certain grievances, which they claimed were weighing them down, were not "lifted" within 30 minutes from the time they gave the notification, they would quit work. The Superintendent gave them 30 minutes to get out of the works, whereupon they returned to their respective duties.

THE President and Directors of the Brookline (Mass.) Gas Light Company entertained a goodly number of visitors on the evening of Thursday last, at a reception tendered at the Company's new Allston plant, the main points about which were so cleverly brought out by Dr. Amory, at the New England meeting last February. A formal inspection of the gas and electric lighting stations was followed by an elegantly arranged and excellently served repast, the consumption of which was attended with many an expression of approval and commendation of the skill and enterprise of the Company's executive management.

UNDER the new contracts for the public gas lighting of Memphis, Tenn., which have been awarded to the Memphis Gas Light Company, and which went into effect on the 12th inst., the price to be paid is 99 cents per lamp per month on a moontable. A forfeit of 10 cents per lamp per night is agreed on, should the lamps remain unlighted through the fault of the Company. Light for the public buildings is to be paid for at the rate of 98 cents per 1,000.

THE kitchens of the elegant new Club House, of the Oxford Club, of Lynn, Mass.—which structure represents an expenditure well on to $50,000—have been fitted with gas ranges, of the Kinsley pattern. Mr. Prichard always keeps an eye—in fact, two—on the main chance.

To further prove his straightness of vision in this respect, we may note that the Lynn Gas and Electric Company is under contract to furnish the town of Nahant, a noted summer resort of Essex county, about 4 miles distant from Lynn, with 30 acres (1,000 candle power) the same to be maintained on a moontable, and to be paid for at the rate of 30 cents each per night.

MR. GEORGE KEATON, formerly with the Bellingham Bay Gas Company, of Fairhaven, Wash., has leased, and will hereafter operate, the works of the Gilroy (Cal.) Gas Light Company. The Gilroy plant was completed about five years ago.

THE Brin Oxygen Company, of Chicago, has been incorporated by Messrs. G. J. White, W. F. McLachlan and F. H. Britton.

IT is likely that the residents of Brightwood, a beautiful suburb of Washington, D. C., will soon be lighted by gas, through a continuance of the mains of the Washington Company to that district.

SOME days ago the Minnesota Supreme Court affirmed the order of the trial court in the case of Louis H. Grieser, appellant, vs. the city of Duluth, respondent, and by the decision declared that municipal corporations cannot grant exclusive franchises in that State. In 1883 the village of Duluth made a contract with the Duluth Gas and Water Company to supply the village with water and gas for a term of 30 years, the village agreeing to abstain from granting any other party the same rights for 30 years, and, in another provision, agreed not to lay gas pipe or to supply gas on village account. Owing to alleged inadequate service, after the plants had been in operation for some time, (Duluth subsequently attained to the dignity of a city) authorized the erection and operation of a water works in the name of the city, and to carry out the proposition sanctioned an issue of bonds amounting to $1,000,000, or more. Grieser, who was a shareholder in the Company and a taxpayer, applied for an injunction and sued for damages by reason of the city's proposed competition. The lower court refused him relief, and the following *syllabus* of Judge Dickinson's decision shows that the Supreme Court agrees with the lesser authority. The Judge said: "Legislative authority to a municipal corporation to provide a system of water works, to grant the right to a private corporation to establish such a system and to supply the municipality with water, and to contract therefor, does not confer upon the municipality the power to grant an exclusive franchise so as to disable the municipal corporation for the period of 30 years from itself establishing water works and a system of supply. Such grants or delegation of authority are to be strictly construed."

ROXBURY, Mass., has been having a "trifling" experience with an imposter, who gains an entrance into residences and stores by representing that he is a State Inspector of gas fixtures.

THE improvements on the manufacturing and distributing plant of the Peoria (Ills.) Gas Light and Coke Company are virtually completed. The Company now is the owner of a really model gas plant.

THE Sioux Falls (S. D.) Gas Company offers to make no charge for services, etc., where parties are desirous of trying a gas stove.

THE *Evening Post*, of Cincinnati, is now yawping for the appointment of an official gas inspector, and we do not suppose the Cincinnati Gas Light and Coke Company would object—although it is likely they would draw the line at Prof. Dudley.

THE original plant of the San Francisco Gas Light Company, at First and Howard streets, has been permanently shut down, although the repair shops will be maintained there for some to come. The Company's station at Bay and Buchanan streets is busy now a spot.

BOYNTONVILLE and Wakefield Highland residents of the Wakefield, Mass., district will not accept the naphtha lamps as public lights recently ordered for the town by the authorities.

Extension of Gas Lighting in France.

According to a contemporary, since 1878, the year in which electric light first became prominent, the following has been the extension of gas lighting in France:

Population.	1878. Places.	1878. Inhabitants.	1889. Places.	1889. Inhabitants.
Under 2,000..	60	84,539	143	197,957
2,000–4,000....	171	522,332	276	822,933
4,000–6,000....	134	656,580	196	951,695
6,000–8,000....	85	580,233	126	872,079
8,000–20,000...	164	2,087,165	187	2,330,095
20,000–40,000..	41	1,132,408	59	1,550,943
40,000–80,000..	21	1,181,726	28	1,590,873
80,000–200,000	8	1,039,513	9	1,078,973
Above 200,000	3	2,658,938	4	3,363,205
	687	9,943,434	1,028	12,758,753

The whole population of France is 32,218,000; but a very large proportion of this population occupies what we would call villages, too small even to support a gas work. There are, however, still 1,662 places with between 2,000 and 4,000 inhabitants, 168 with from 4,000 to 6,000, 27 with between 6,000 and 8,000, and 7 with between 8,000 and 20,000 inhabitants which have no gas; and it is said that there are in the South of France some forgotten villages where the resin candle, the primitive precursor of the tallow candle, is still in use for lighting the streets at night.

Why Does Hot-Air Supply Brighten Gas Flames?

A writer in the *Gas World*, commenting on this query, says: That heated air supply does increase the lighting power of a gas flame we all know, but why it does so is not at once obvious, though the matter is, in its broad outline, very simple when inquired into. What does the brilliancy of a gas flame depend upon? We know that it cannot be heat alone, for a flame of pure hydrogen is much hotter than a gas flame, and yet is next to non-luminous. It depends upon incandescence of something solid. The something solid must be derived from the gas, and can be nothing else than the soot which is produced by the action of the heat of the flame upon the gas before it has become completely burned. The presence of this solid matter can be shown in more than one way. In the first place, a gas flame will cast a shadow in the sun, and a much deeper shadow than anything observable with a hydrogen flame, which practically produces no shadow. In the second place, as Professor Sir G. G. Stokes has shown in a letter to Professor Tait, published in the last part of the proceedings of the Royal Society of Edinburgh, a beam of sunlight, condensed by a lens and passed through the luminous part of a flame, produces a bright patch of light brighter than the general flame, and evidently due to the scattering of sunlight by matter in suspension. The effect is rendered more conspicuous by viewing the whole through a cell with an ammoniacal solution of a salt of copper or through a blue glass colored by cobalt. The light reflected from the flame was found to be so polarized as to show that it had been reflected from solid particles. A candle flame shows the phenomenon better than a gas flame; but in all cases the layer of glowing soot, attacked from without by air, and from within by carbonic acid, tends to unite with it and form carbonic oxide, is extremely thin.

Then what does the brilliance of an incandescent solid depend upon? It depends, in the first place, upon the nature of the solid itself, and in the next upon the temperature; but the effect of change of temperature itself depends also upon the nature of the solid. Becquerel stated the experimental facts in the form of a mathematical formula, which has been criticized as to its details by Preece and others. But if the solid remain the same, the brilliance varies with the temperature; not in direct proportion, but in a more complicated way. Still the broad upshot is that the higher the temperature the greater the brightness. To increase the brightness, therefore, we must increase the temperature; or to keep up the brightness we must keep up the temperature. If the temperature fall, the brightness falls also; and so we must remove or neutralize the causes of cooling. What are the chief of these? In the general case the main cause is the nitrogen of the air supply. This contributes nothing, but absorbs heat in the flame and from the flame.

Let the flame, then, be supplied with oxygen free from nitrogen; what will happen? There will be no loss of temperature due to nitrogen; but, on the other hand, there may be no sufficient chance for the adequate formation of glowing soot. Suppose, then, that we partly prevent the cooling effect of the cool nitrogen of the ordinary air supply by heating that nitrogen, that is by heating the air supply, the nitrogen does not now require so much heat to be absorbed by it in order to bring it to the temperature of the flame. Similarly, the oxygen itself contained in the air supply does not require so much heat in order to enable the products of combustion to reach the flame temperature if it is already hot when admitted to the flame. But as the amount of heat liberated by the complete combustion of a given quantity of gas is always the same, the result of a hot air supply is that the flame is enabled to reach a higher temperature, and therefore the glowing soot in the flame attains a more brilliant incandescence.

There is, however, a cause acting which tends either to increase or diminish the light produced, according to circumstances. The air supply, being hot, is less dense; it therefore contains less oxygen to the cubic foot; and if the air supply be limited, the combustion may be less complete, and a lower temperature, with a smoky flame, may ensue. On the other hand, if the air supply be adequate, the flame may itself be increased in area by reason of the lessened supply of oxygen. From this it will be seen that the phenomenon, which in its broad outline is simple enough, is complicated by secondary phenomena, which make the means of obtaining the most successful and advantageous arrangements for applying the hot air principle a matter of experiment and adjustment.

The Market for Gas Securities.

The market for city gas shares shows no change, and while dullness is reported, it is the dullness of strength. Consolidated is at 113⅝ to 114¼; Equitable is in demand at 145, and a small lot of Mutual sold during the week at 138. Brooklyn shares are active and strong, the notable advance having been made in Citizens, for which 105 is bid. The consolidation seems to be farther off than ever, which is not to be wondered at, if the rumors respecting the appraiser's return as to the value of the Brooklyn Company's real estate are anywhere near authentic. The figure reported to us is so ridiculously low that we refrain from printing it. Chicago gas is as before, and Laclede gas is in some demand at 19¾ to 20. The annual meeting of the U. G. I. Company is set for May 2d, and the annual meeting of the Standard Company this city, will be brought off on the 11th of the same month.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

April 25.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	113⅝	114¼
Central	500,000	50	87	—
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	145	150
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	135	—
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	40	45
Preferred	5,000,000	100	91	93
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	111	—
Citizens	1,200,000	20	105	—
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	130	131
" Bonds	300,000		102	—
Peoples	1,000,000	10	85	—
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	101	—
" Bonds (5's)	70,000	—	100	—
Nassau	1,000,000	25	139	—
" Ctfs	700,000	1000	99	100
Williamsburgh	1,000,000	50	123	—
" Bonds	1,000,000	—	107	110

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Will some Officer or Superintendent of a Gas Company, who knows a sober and worthy man, experienced in charging retorts and making coal gas, kindly put this advertisement in his way, so that he may apply for a steady job in a small gas works 15 miles from New York City? Address

881-tf "STOKER," care this Journal.

NOTICE OF MEETING.

The United Gas Improvement Company,

Drexel Building, Philadelphia, April 20, 1892.

The Annual Meeting of the Stockholders of the United Gas Improvement Company will be held at the Company's Office, Drexel Building, Philadelphia, on Monday, May 2, at 12 o'clock noon, when an election will be held for a President and six (6) Directors to serve for the ensuing year, and such other business transacted as may be brought before the meeting.

The stock transfer books will be closed from 3 P.M., Tuesday, April 26, until 10 A.M., Tuesday, May 3.

EDWARD C. LEE,
881-1 Secretary.

WANTED,

An Active Young Man to take entire charge of a Small Works.

881-1 Address "G.," care this Journal.

WANTED,

A Competent Man as Manager for Works of 30,000,000 Out-put.

Man willing to start with moderate salary and work up preferred. Address

881-1 "C.," care this Journal.

POSITION WANTED,

As Superintendent of a Small Gas Works,

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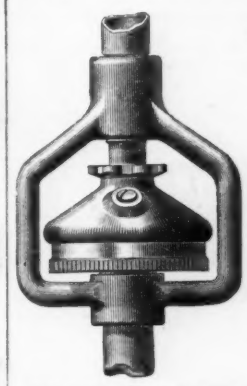

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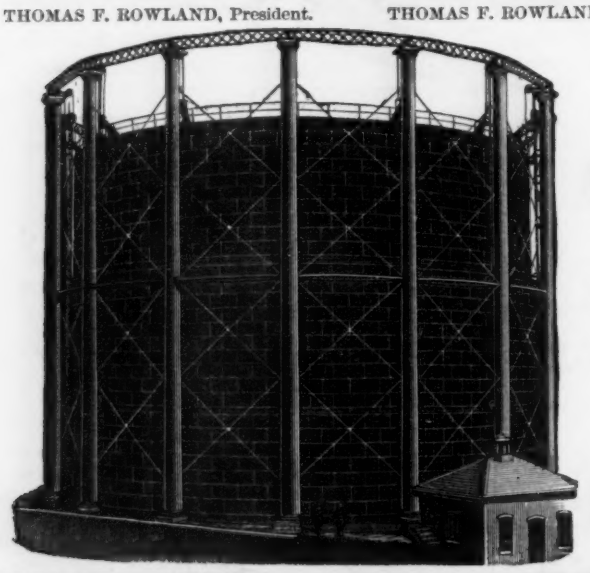

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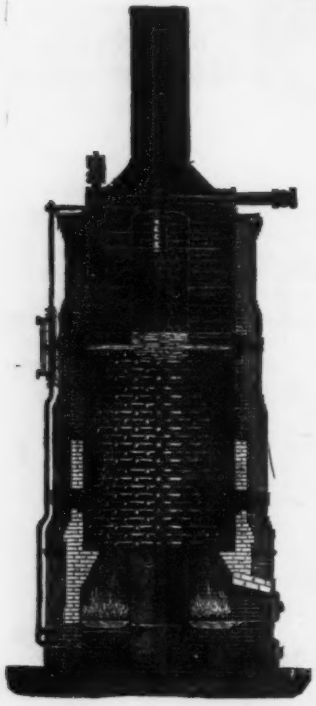

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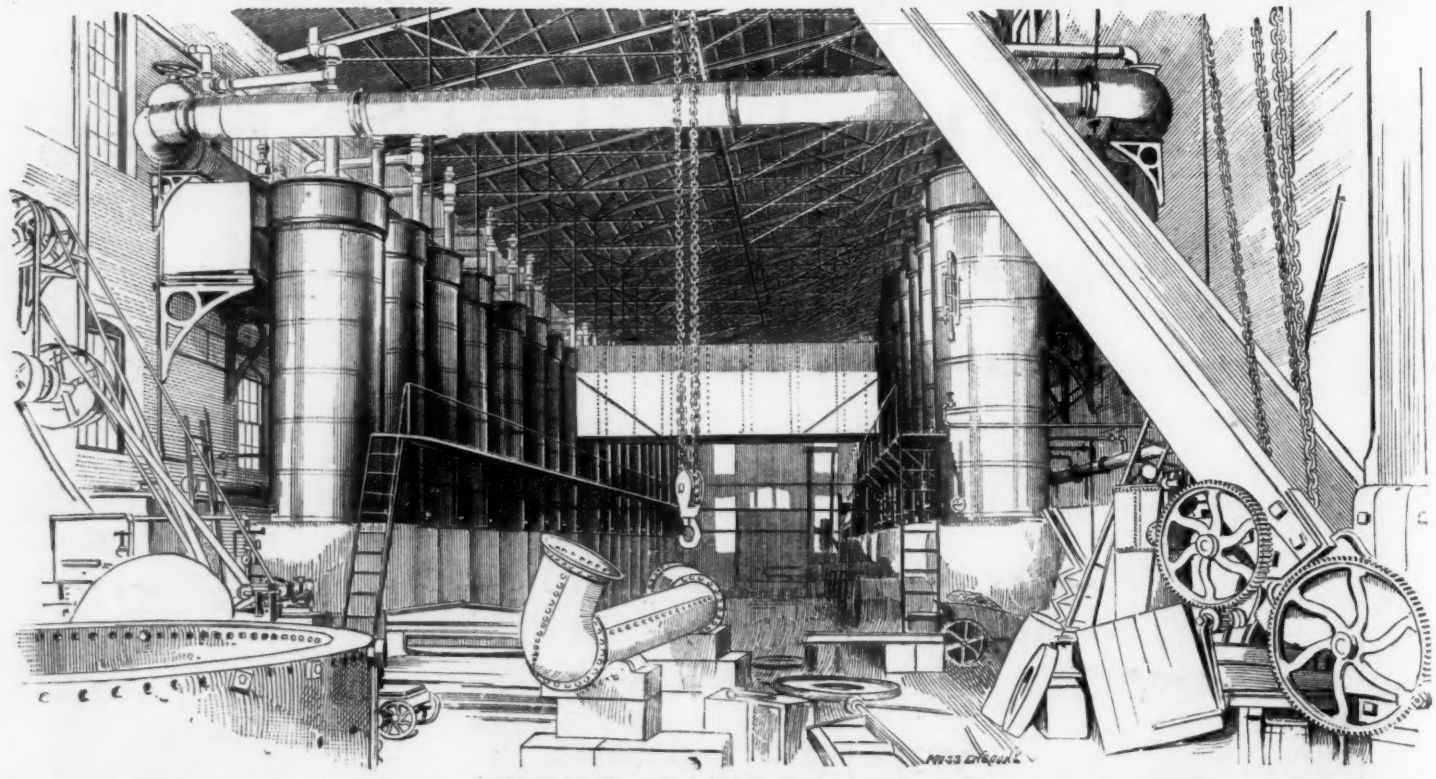

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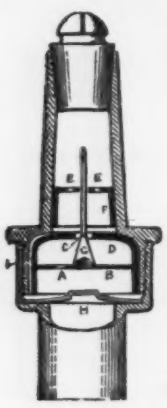

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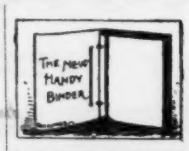

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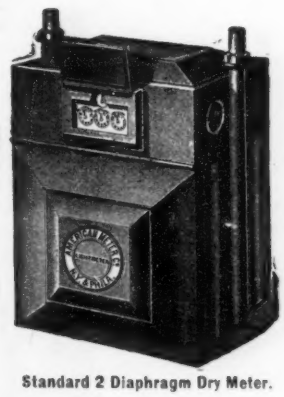

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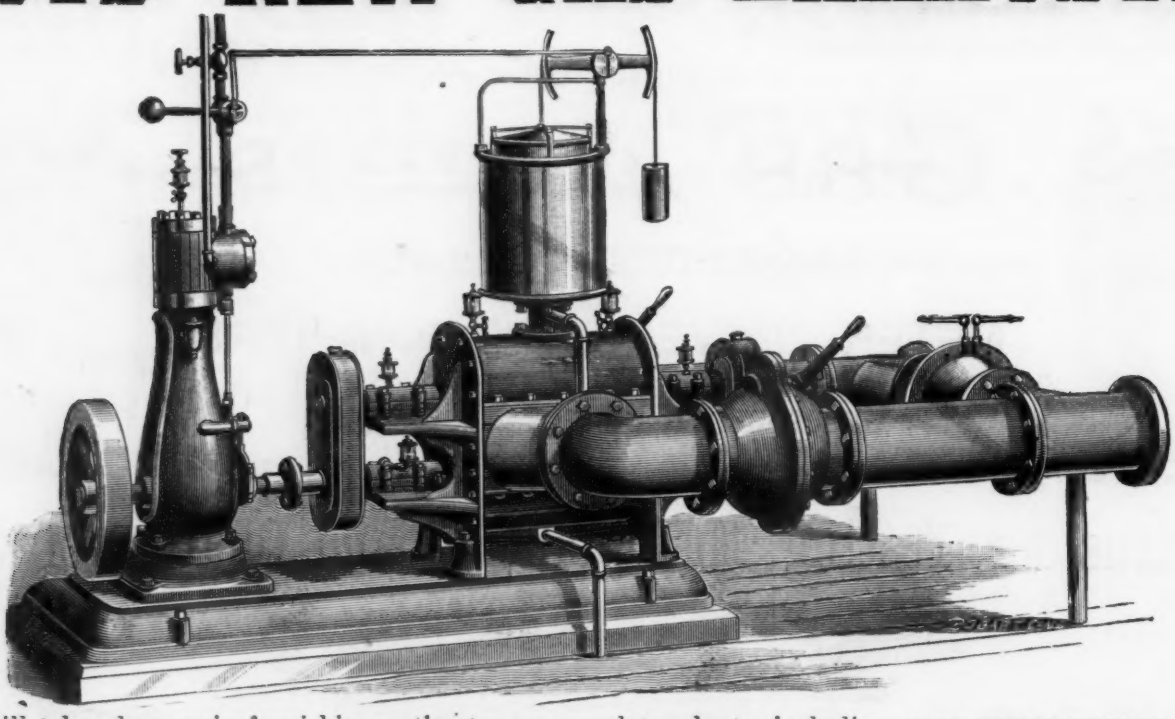

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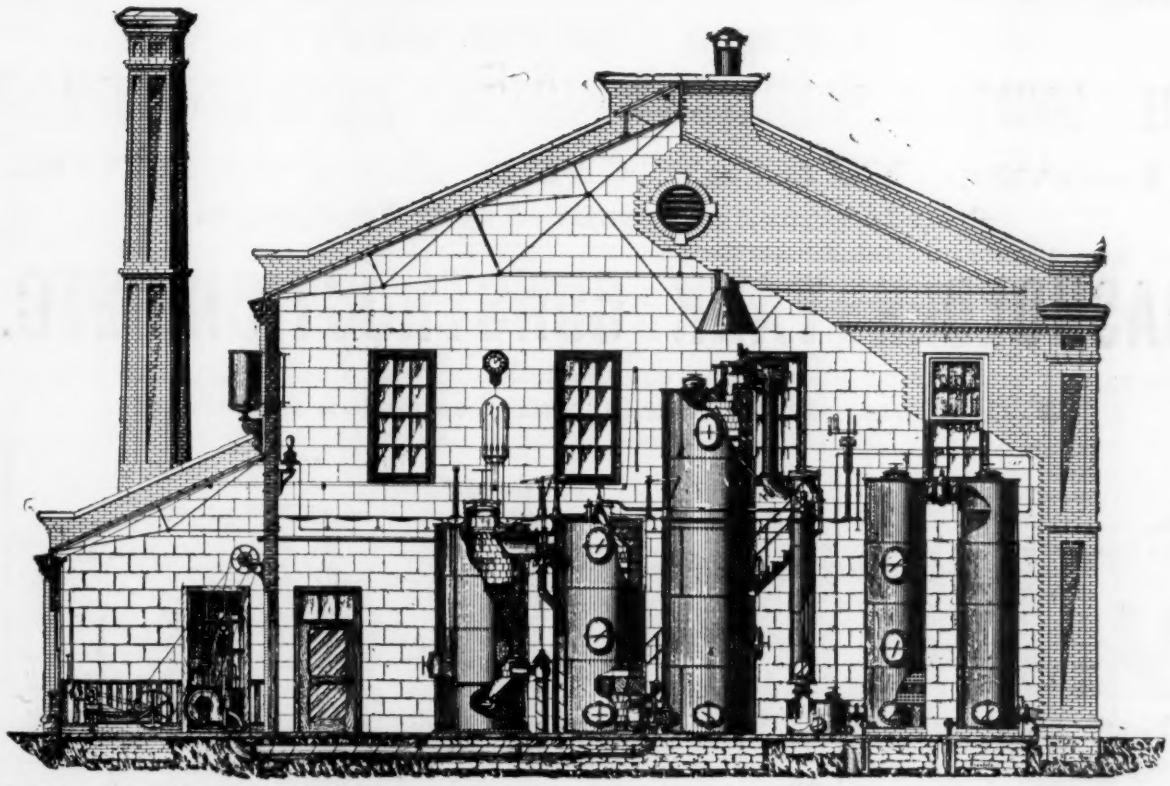

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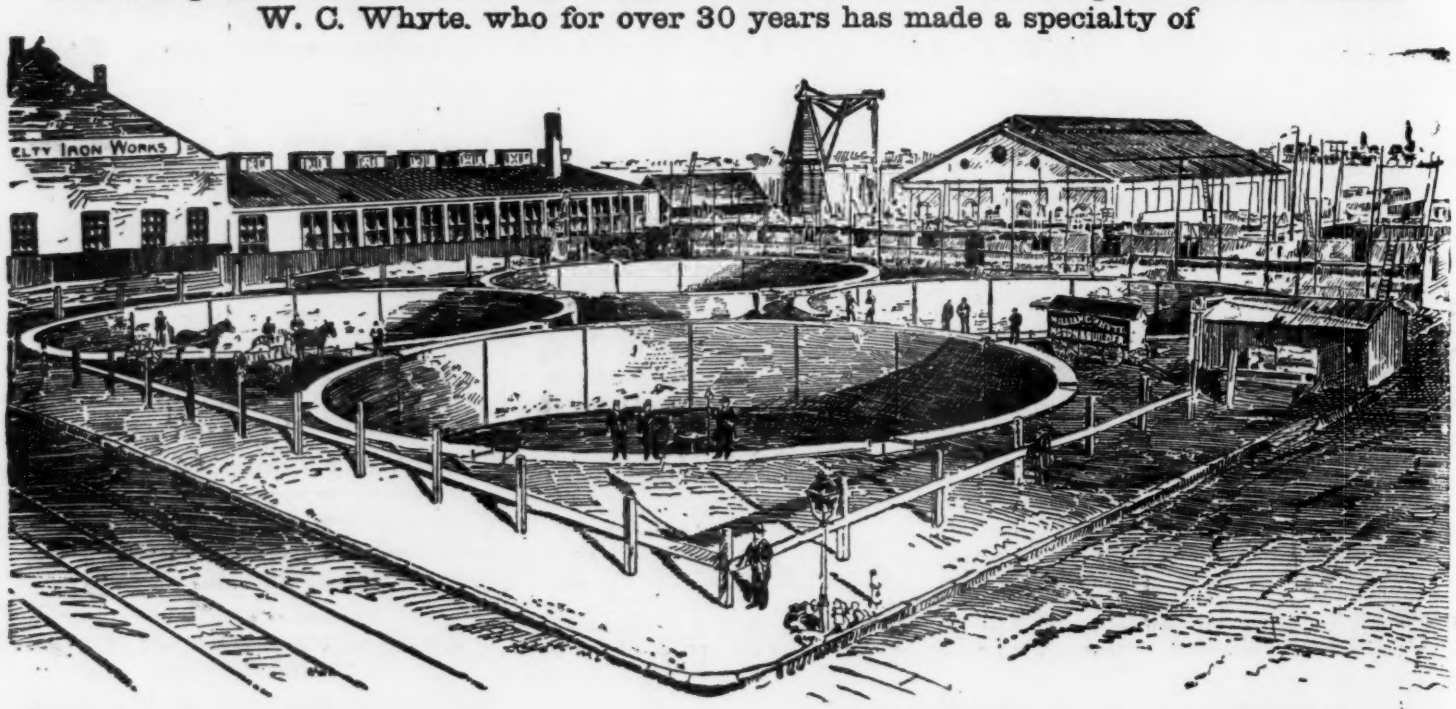

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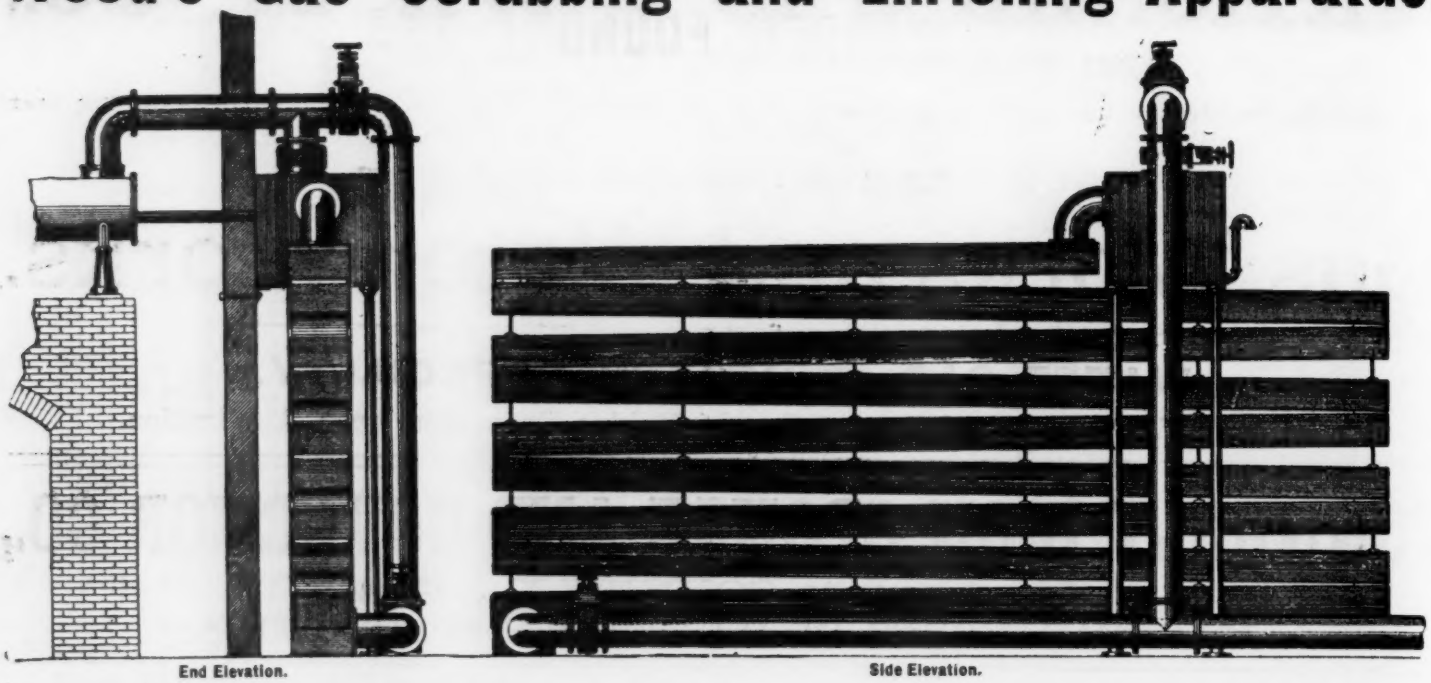

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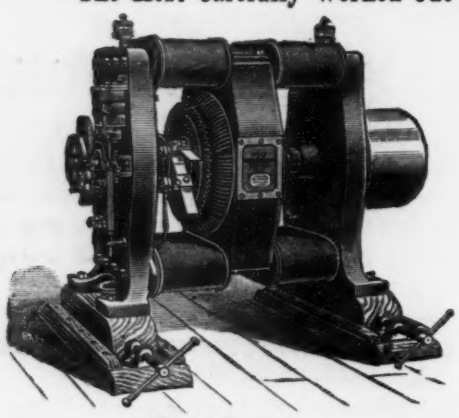

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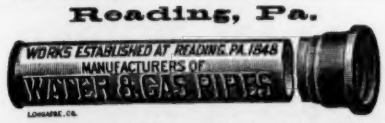

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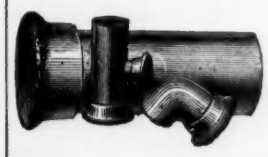

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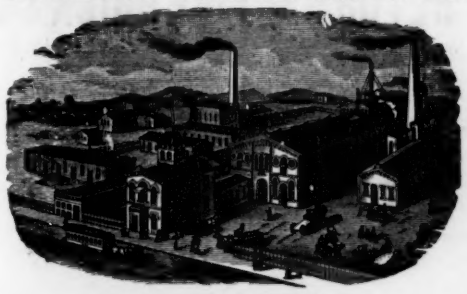

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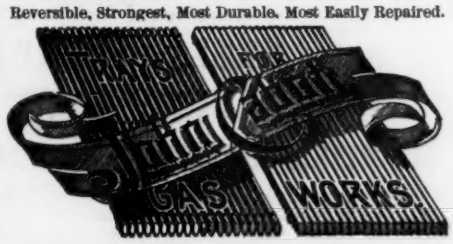

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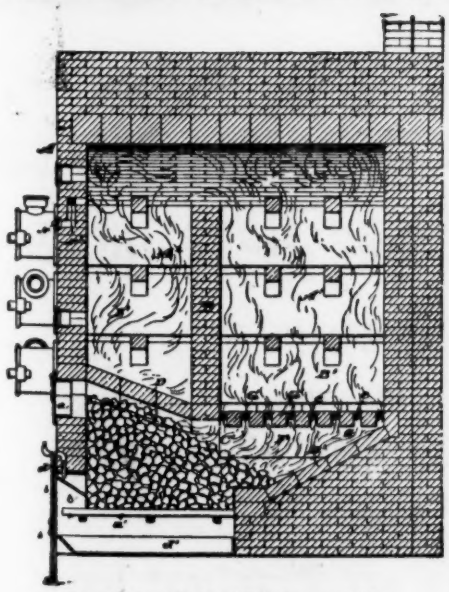

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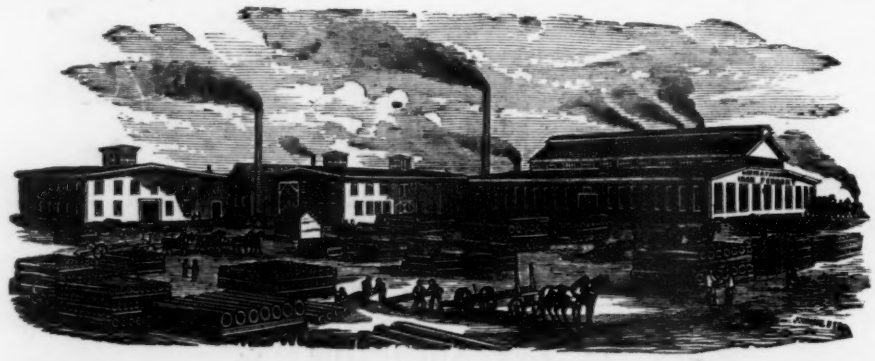

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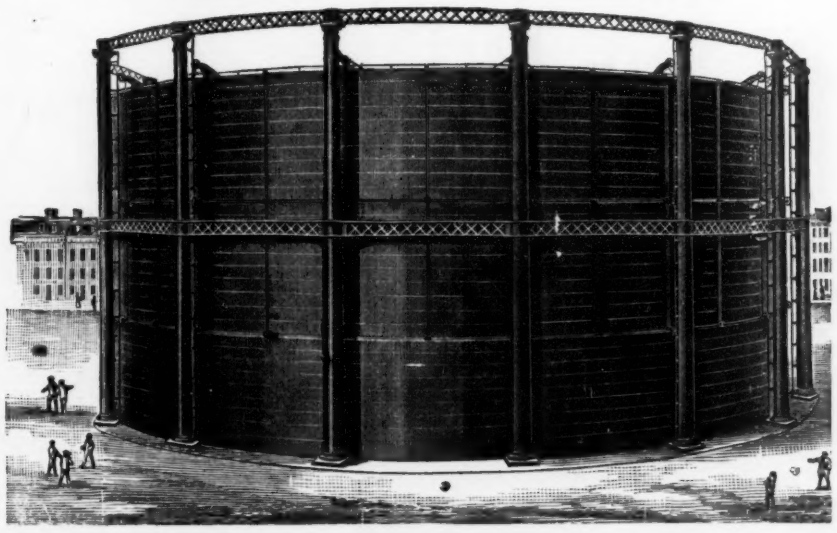

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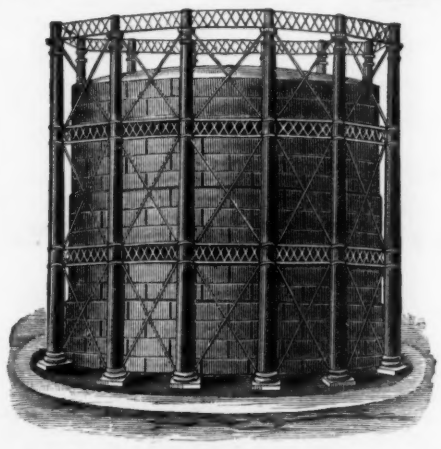

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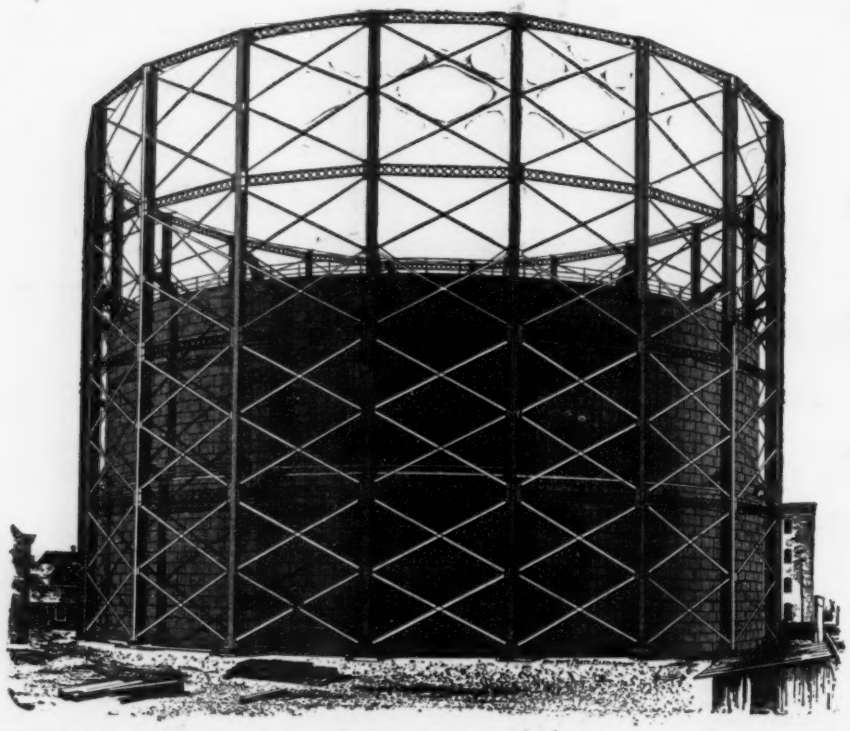

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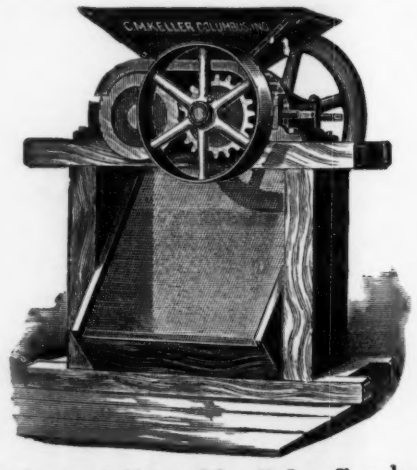

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